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Products finishing Contents

Volume 11 SEPTEMBER, 1947 Number 12

Editorial 23

Synthetic Finishing Operations at Philco..... 24
By Herbert Chase

Racks for Finished Parts..... 34
By John E. Hyler

Barrel Finishing of Metal Products
By H. Leroy Beaver
Part 13—Barrel Finishing Procedure and Its Relation to Porosity of Electrodeposited Surfaces..... 38

Electroless Plating on Metals by Chemical Reduction..... 54

Finishing Clinic
By Dr. Allen G. Gray

High-Solids Metal Lacquers Offer New Possibilities.... 62

Determination of Traces of Copper Impurities in Nickel Plating Baths 72

Proper Control of Pickling Operations Important in Many Finishing Operations 74

Allyl Starch Coatings 78

High Temperature Protection of Steel with Ceramic Coatings 80

Practical Applications of Modern Products
Plating Plant Produces 1½ Acres of Plating Every 8-Hour Shift 88

Electropolishing Process for Stainless Steel..... 92

Appliance Manufacturer Gains Precision with Power Brushing 94

News of the Industry..... 98

Finishes That Aid in Appearance and Utility.....108

New Equipment and Materials 110

The Finishing Touch 132

Opportunity Section 133

Catalog Library 134

Index to Advertisements 136

10

reasons why your next spray booth should be a BINKS Dynaprecipitor

Only a Binks Dynaprecipitor gives you all these advantages.

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10 Better working conditions: This booth keeps the shop cleaner and more healthful... makes it a pleasanter place in which to work.

Products Finishing

Add One More Asset

Not so many years ago, finishers of metal products had at their command only a limited number of finishes for their products. The finishes consisted of paints, varnishes, japans, and a few clear lacquers, and most of them had been manufactured for years according to standardized formulas. The experienced finisher knew all that he needed to know about each of the finishes, and within their limitations he generally was able to use each to the best advantage.

Since that time, however, the finishing business has been revolutionized. Modern chemical science has made available thousands of new raw materials for finish manufacture — lacquer bases, solid and liquid plasticizers, natural and synthetic resins, pigments, solvents, and thinners — and, as a result of research, new ones are being added every day. Since each of these materials, either alone or in the proper combination, imparts certain properties to the finish, an almost unlimited number of new finishes are constantly being developed.

This evolution in the finishing industry would not have taken place if there had been no need for it. The development would not have had the required commercial impetus if only a few different kinds of finishes would suffice for all purposes — which certainly is not the case. Finishers of metal products have a multitude of requirements, and a multitude of different finishes is needed to meet them. On the other hand, so great are the present resources of the modern finish manufacturer that he can, broadly speaking, supply almost any kind of a finish which the manufacturer of metal products may want.

The finisher of today cannot know all he ought to know about the finishes he is using. Their composition has become too complex and varies too widely for that. In attempting the selection of finishes entirely on his own, the finisher runs the risk of using a finish that may be unnecessarily expensive for the work in hand or incapable of providing the proper protection to the metal on which it may be applied. The user of finishes should look to his supplier for expert, conscientious, painstaking advice and service to ensure the use of a balanced finish.

Synthetic Finishing

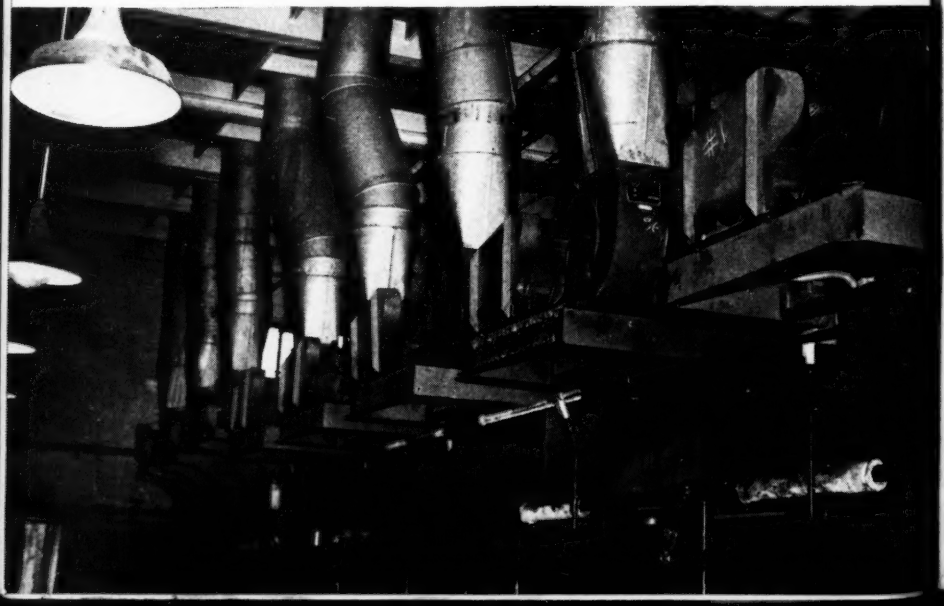
Operations at PHILCO

Radio parts receive diversified coatings whose enduring properties are enhanced by fast baking.

By HERBERT CHASE, M.E.

THE wide use of steel for car radio housings, record player parts, and similar items has necessitated the use at Philco's Philadelphia plant of a central finishing department for applying various types of finishes on an efficient, large quantity basis. Many of the parts are first bright zinc plated to provide for a base of higher corrosion resistance properties for spray painting than would bare steel with enamel applied direct. In other cases, steel is Bonderized without plating prior to the ap-

Fig. 1—Rear view of row of spray booths along aisle where tote boxes of parts to be enameled are spotted for feeding down chutes between the booths



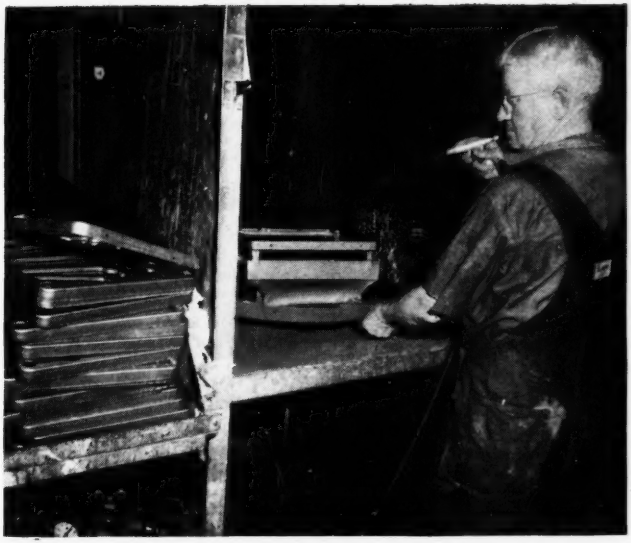


Fig. 2 — "Hammertone" finish being produced on a record changer frame by the use of a solvent applied in droplets from a special small gun while the previously applied enamel coat is still wet. At the left can be seen one of the chutes down which parts to be sprayed in the next booth are supplied to operator.

plication of a synthetic enamel and, in still other instances, the zinc plating is Bonderized before it is painted to further add to the corrosion resistance and to promote a better bond with the enamel.

The choice of the treatments that precede enameling depends upon the company or customer specification which, in turn, is dictated by service requirements and by cost considerations. The same can be said of the enamel coat or coats except that, for the latter, the matter of appearance, as well as cost and serviceability, becomes a prime consideration.

For most items finished in the Philco plant, synthetic enamels or clear lacquers are nearly always chosen. These finishes, however, vary in composition and in color as well as in texture, depending largely upon the appearance desired. At present, there is considerable demand for so-called "Hammertone" finishes which yield a somewhat mottled and usually rather high luster surface. Actually, the surface is quite smooth but possesses somewhat the appearance of having received light dents from a hammer. This type of finish is not only attractive but has some tendency to mask minor surface irregularities present.

Except in emergencies, Philco follows the practice of requiring that suppliers of enamels rush to its laboratories a sample of actual production runs of each type of finish used before bulk orders are shipped. This sample is carefully tested and some of it is applied to metal by the same method as that used in production to check the results obtained. If the tests show that requirements are met, a wire is sent to the supplier to make the production shipment. If not, the supplier is advised and must remedy the deficiency before shipping the bulk lot. Tests are also made when shipments are received before the finishing material is released for use in the plant.

All synthetic finishes used at the Philco Philadelphia plant are applied in a row of ten spray booths, as shown in Fig. 1. These booths are located across an aisle from two conveyorized baking ovens. Beside each booth is an inclined chute, the higher end of which is located along another aisle where

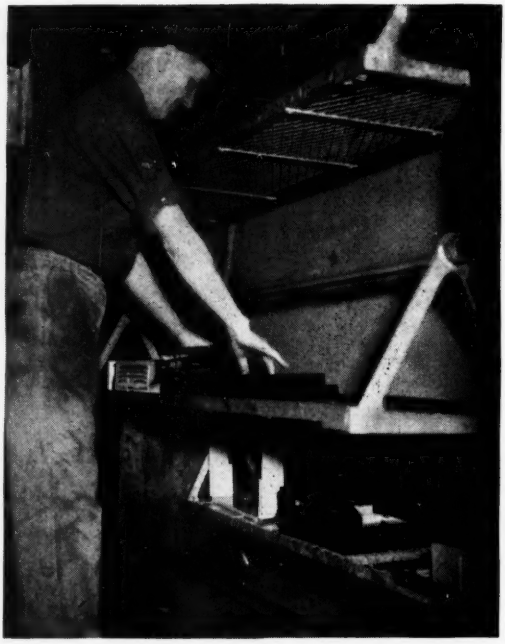


Fig. 3 — Immediately following spraying, parts are placed on the screen racks of the baking oven conveyor, each part being handled in such a manner that the finish on exposed surfaces is not marred.

parts ready to be sprayed are delivered in tote boxes by fork truck or other means. Boxes are spotted next to the chute down which the parts are to be fed, and are placed in the chute by workers assigned to this one particular job. In general, each worker can keep several chutes filled; consequently, parts are always available to each spray gun operator who only has to reach for a part and place it on a holder in his booth.

With this arrangement, the aisle along which spray gun operators work is kept free of tote boxes and banks of unfinished parts, the banks being in the chutes immediately beside the booths. Thus, the sprayers are not bothered with any handling before spraying except that involved in shifting the part from the chute into the spray booth, a distance of some two or three feet.

The work holders used during the spraying operation are varied to suit the job. If a part has to be turned in order to reach more than one side in spraying, the holder is usually a small turntable or a table which the sprayer can move as required to coat all surfaces. All spray booths are equipped with water washed backs and with guns arranged either for gravity or pressure feed from tanks charged in an adjacent mixing room. A pressure of approximately 10 lb. is kept on the pressure tanks, and a pressure of 60 p.s.i. is supplied for spraying.

Metal masks are provided for covering areas that are not to be sprayed. In the case of two-piece housings, one half of which telescopes over the other, as in most car radios, for example, the housing is plated and assembled before spraying. As a result of this type of construction, masks are unnecessary. However, enamel is not sprayed on the lapping zinc plated surfaces so as to maintain good grounding contacts.

Upon completing the spraying of a part, the spray operator lifts it in such a way as not to mar the sprayed surface and places the part on a tray of the nearest oven conveyor, which is located behind him and just across a narrow aisle. This time-saving arrangement eliminates the necessity of having trays and supports for the parts in the aisle and, although a slight pause is required for the shifting of the work, the effect upon spraying

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rates is not great. No helpers for handling sprayed parts are necessary and, since the spray operators are responsible for handling, they can see that parts are unmarred when they are placed on the conveyor.

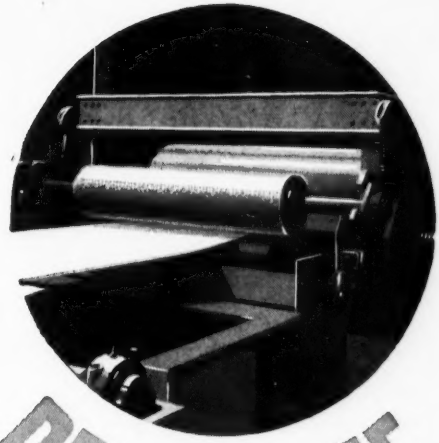
To produce the so-called "Hammertone" finish, the enamel used contains, in addition to the color pigment, some aluminum powder which later provides the hammered effect. This synthetic enamel is sprayed on in the usual manner and produces a lustrous surface without mottle or "texture." Immediately following this spraying operation while the part is still in spraying position and the enamel is still wet, the surface is lightly spattered with a mixture containing equal parts of ethyl-acetate and varnish maker's and painter's (VM&P) naphtha. This mixture is applied with a small spray gun of the type used for sprinkling clothes with water in laundries, as shown in Fig. 2. The gun produces a mist with some drops, and the solvent application results in the formation of bright spots or a mottled surface resembling that produced by hammering.

As illustrated in Fig. 3, the conveyors used in transporting the sprayed parts have pendant frames or wire mesh "shelves" that remain horizontal as they pass through a baking oven at a speed which requires each shelf 55 minutes to reach the discharge end of the oven. During this traverse, the parts are heated to a temperature of 275 deg. F. and are maintained at this temperature long enough to effect thorough drying and sufficient baking to ensure maximum enamel adhesion.

When the racks of parts reach the end of the oven conveyor, they are unloaded by hand, as shown in Fig. 4, and placed on a belt conveyor which travels along a bench and passes the ends of the two ovens, as shown in Fig. 5. In the case of small parts, tote box trays are used. On the conveyor belt, the enameled surfaces are inspected and parts that pass inspection are either packed for shipment or are loaded into tote boxes with such separators as may be required to prevent marring in transfer to plant assembly line. Rejects are either touched up or are sent to a stripping tank for removal of the enamel, after which

Fig. 4—Discharge end of the baking oven where parts, some of which have a "Hammertone" finish, are removed from the carriers and placed on racks, shown at the left, or set on a belt conveyor for inspection

How to give Phenolic Resin Sheets a uniform BRUSH-OFF



● A uniform pattern on the surface of phenolic resin sheets depends on the performance of your power-driven brush. A Pittsburgh Brush has all the specifications necessary to give you a mat or a satin finish of the desired texture. ● The dense fill mixture of special white tampico is carefully inspected for coarse fibres which cause irregular patterns. When spiral wound and trimmed, the fibre ends are finely sand-papered to assure smooth rotary action with abrasives. ● There's no guesswork in the construction of Pittsburgh Power-Driven Brushes. What's more, they're designed to stand up under the heaviest usage.

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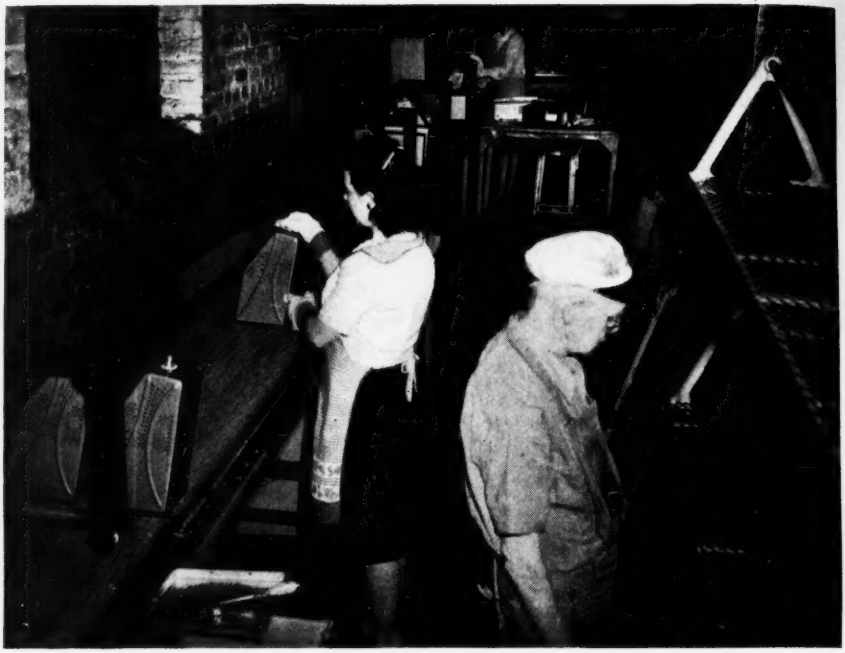

Fig. 5—Belt conveyor (left) on which parts coming from the baking oven (right) and destined for shipment without further assembly work in the plant are placed for inspection and packing after cooling

they undergo the same finishing procedure as new parts.

"Infra-Red Lamps for Better Production." How manufacturers may use infra-red lamps for heating, baking, and drying processes is explained in kits of informative material now being distributed to electric utility companies by the General Electric Lamp Department. Included with the material is a 25-minute sound slide film in color entitled "Infra-Red Lamps for Better Production," and literature for distribution to audience groups.

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"Is There Poison in Your Corrosion-Resisting Alloy?" is the title of a four-page bulletin released by The Duriron Co., Inc., Dayton 1, Ohio. The bulletin deals principally with the presence of copper as a possible solution contaminator in corrosion-resisting alloys. A formula is included which shows the percentage of copper by weight that would be absorbed by a corrosive solution being handled by a Durcopump made of Durimet 20, a special stainless steel alloy. Copy of Bulletin M-5 free upon request.

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Racks for Finished Parts

The author presents an interesting discussion relative to the design of racks used in supporting various shapes and sizes of metal parts that have been freshly sprayed or dipped.

By JOHN E. HYLER

IN providing racks for finished parts, it is usually necessary to design them in such a manner that they do not contact a very large area of the parts being held. In the case of racks used in transporting materials into or through baking ovens, whether they be of a truck type or for use on chain conveyors, it is important to leave the entire surface of the parts being baked exposed to the heat or as nearly so as possible. Racks used for supporting workpieces to which finish coatings have been freshly applied must be designed to contact even a smaller amount of the surfaces to guard against the finish being badly marred.

The drawing herewith shows a wall-type rack which has been employed to advantage for supporting freshly-sprayed or freshly-dipped parts of the flat type that can be stood on the floor against the wall and spaced slightly apart to allow for drying. In Fig. 1 at **A** can be seen a small portion of a rack designed for this purpose. As shown, the rack, which includes evenly-spaced V-notches, is of the nature of a lineal strip with its straight edge fastened against the wall. Note that three different thicknesses of material, designated as **B, C,** and **D,** are supported in these notches with only two-point contact against the extreme corners of the stock. In cases where sheet metal or other very thin stock is to be supported,

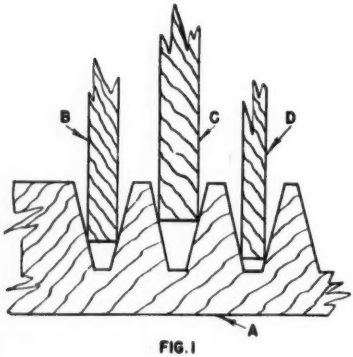


FIG. 1

Drawing of racks for finished parts

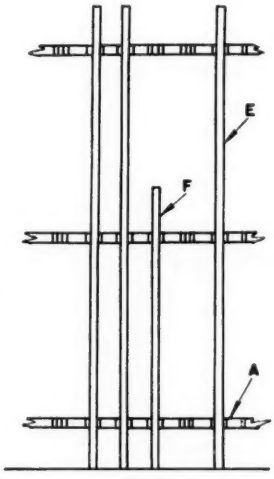
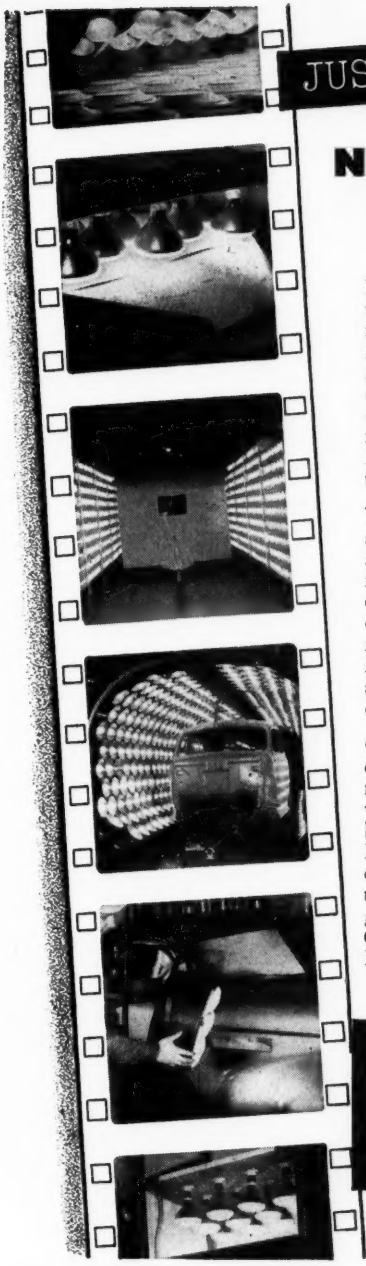


FIG. 2



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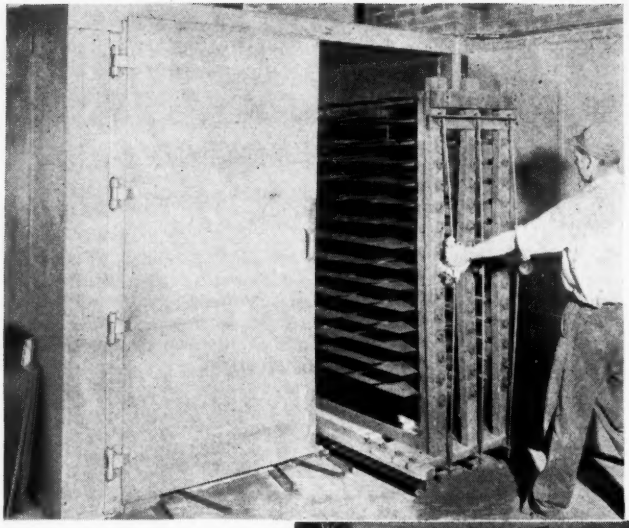
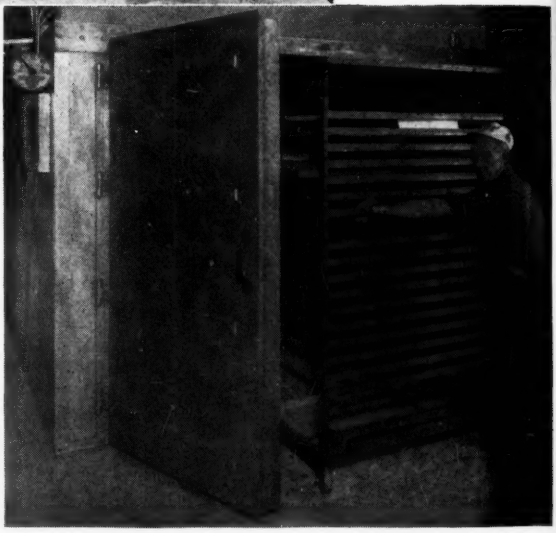


(Left) This rack-type truck includes round rods for the line-contact support of sheet metal parts during the baking of finishes on the parts. *(Photo courtesy Despatch Oven Co., Minneapolis, Minn.)*

lel to the wall, provided that the notches in all of the strips are spaced alike and are arranged in a true vertical registration with one another.



(Right) This rack-type truck is adapted for supporting small and large sheet metal parts in baking finishes. *(Photo courtesy Despatch Oven Co., Minneapolis, Minn.)*

the V-notches in the rack can be cut all the way down to a point.

Figure 2 of the drawing shows three V-notch racks fastened along a wall in parallel. Usually, three strips so arranged will accommodate all of the different lengths of stock to be dried in this manner. The shorter material will be supported by only the two lower strips, as at **F**, while longer material, as at **E**, will have a bearing in all three strips. However, as many such strips as may be needed to meet a particular case can be fastened in paral-

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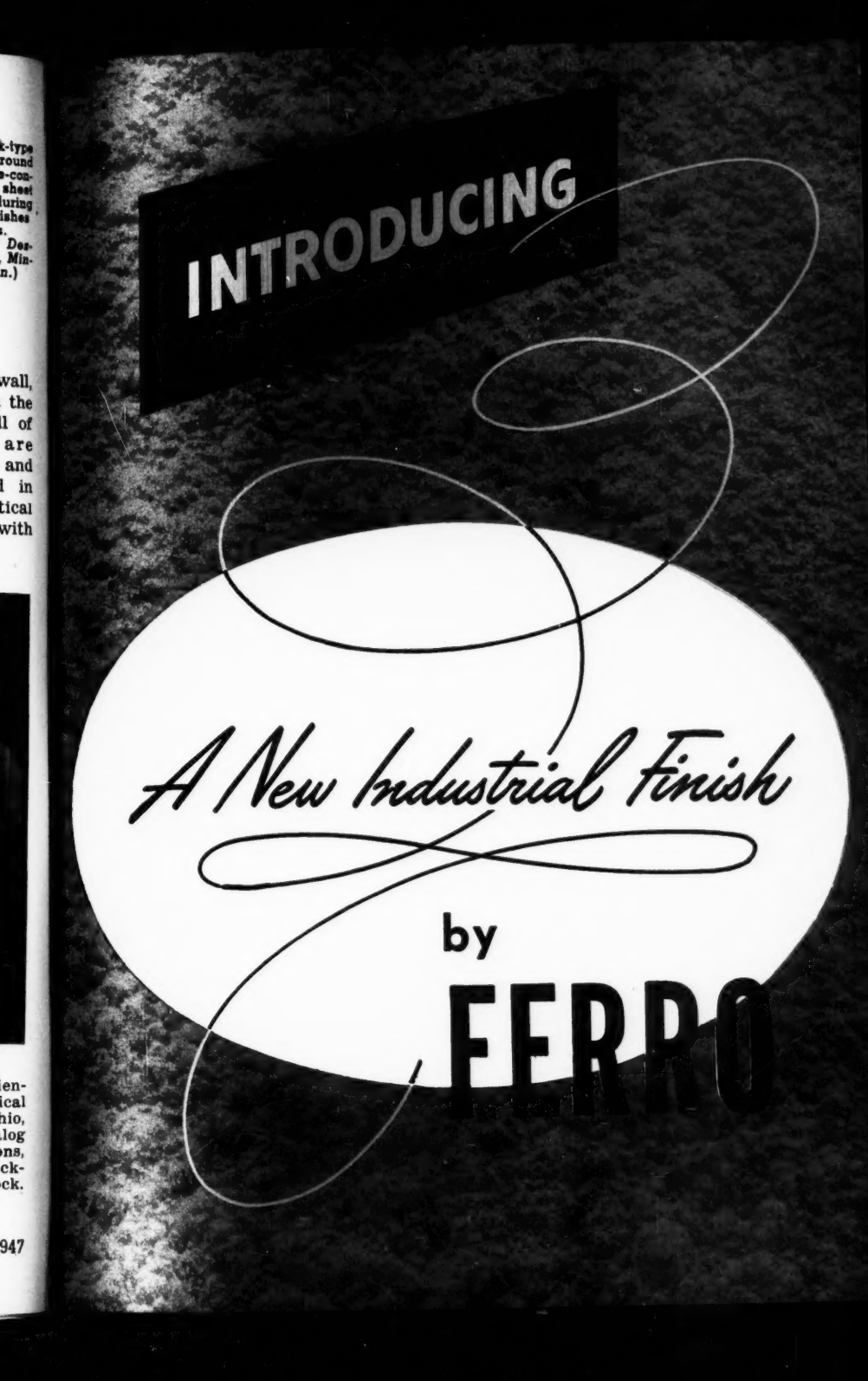
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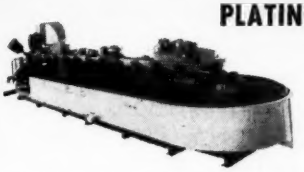

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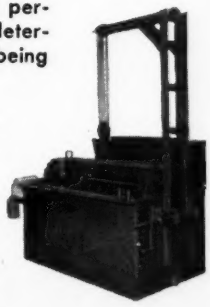
The cylinder is made of perforated steel, heavily rubber covered. Diameter of perforations can be any size specified—determined by the character of the work being done.



Heads of cylinder are also of perforated steel construction, giving a solid welded construction throughout.

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Barrel Finishing of Metal Products

Part 13— Barrel Finishing Procedure and Its Relation to Porosity of Electrodeposited Surfaces

By H. LEROY BEAVER

Barrel Finishing Consultant
Lansdale, Pennsylvania

IT has only been a short time ago since a prominent manufacturer of metal products said to us, "I've noticed that from time to time you stress porosity of plated surfaces. Well, we don't have that condition, at least I've never seen it on any of our products." Further conversation developed the fact that he had never examined these surfaces under any magnification whatever, and, because pores in the surface of the plate were not visible to the naked eye, he assumed that they were not present.

In just about the same sense we could each examine a small section of our own skin and the pores would not be visible to the naked eye here either. Surely, we do not require the calling in of medical authorities to convince us that the skin is perforated with millions of pores. Electrodeposited surfaces are, in at least a sense, also perforated with the same porous condition, much as we would like to have it otherwise. In just the same manner that a doctor would assure you that your skin is full of pores, we have authorities of unquestioned ability who give us the same assurances with regard to the porosity of electroplated surfaces. Maybe, we had best extend the sub-title of this discussion to include cracks and fissures, and by that we mean those areas generally found in angles of metal stampings where the metal is stretched beyond its elastic limit and cracks develop.

Considerable stress has been placed upon the various "bright" deposits and one of the principal talking points has been that with bright deposits the necessity for a barrel finishing operation disappears. However, we have never met any competent authority who would be so courageous as to claim that any of these so-called bright deposits were pore-free, and, as a matter of fact, authorities tell us that, as to pores, there is no difference in the relative proportions we might expect to find whether the deposited coating is dull or bright.

Then again, we have been asked so very many times whether it was absolutely necessary in order to obtain the best possible final finish, that the parts be barrel finished prior to plating and

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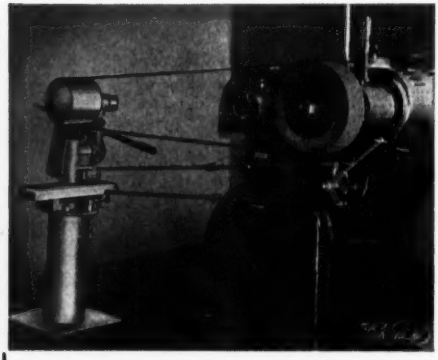
also after plating. There is, of course, little question that the surfaces of parts finished in an appropriate barrel with adequate load are work hardened and any porous areas are closed and, thus, do not reappear as pores after plating. Most platers will tell you that they cannot "plate over holes," and that the best they could do would be to try to pile the plate on so thick that if the grain structure were sufficiently coarse, the grain particles might, after a time, bridge over the holes and thus seal them. This, however, is definitely not a recommended practice.

As a general procedure, parts are not barrel finished prior to plating for the purpose of closing pores in the base metal itself, but rather for removing burrs and for smoothing the surface. It is true, too, that in some plants the blanking and forming operations are such that no preliminary barrel finishing operation is required, while in others the blanked pieces are so outrageously burred that nothing short of a barrel finishing operation would ever adapt them for plating.

Where no burring operation is required, we think that a preliminary barrel finishing operation is unnecessary, provided two coats of metal are to be deposited such as copper on steel followed by nickel. In this respect, we like to think back to a case that has always been an outstanding one with us even though the operations were carried out years ago when silk curtains on all closed automobile bodies were the vogue. The Carey-McFall Company of Philadelphia was then, we suspect, the largest single producer of these curtain end brackets in the country. The electroplating and finishing departments were under the direction of Mr. Albert Hirsch, a master plater and a quite considerable authority in his own right, as well as principal instructor in electroplat-



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ing and electroforming in one of Philadelphia's vocational schools. The bracket job was one of the finest examples of blanking and forming that we have ever seen in any particular establishment.

The parts were taken from the press shop, adequately cleaned, and immediately copper plated. They were then barrel burnished in the conventional manner in Abbott 30 x 16-inch high and narrow barrels and always with a pressure load of burnishing materials of 1,000 lb. This was important, for without adequate pressure, porosity could not have been cured by a barrel finishing operation. Following copper plating, the parts were again cleaned and sent directly to the nickel bath. After the nickel had been deposited, the parts were subjected to a light barrel run in soap solution.

The Carey - McFall organization proudly points out that it had no single record of reported failure of the plated surfaces when the above procedure was used, and indeed today if you could find an old outmoded and antiquated closed car body on some used car or scrap lot that was equipped with these curtain brackets, you might be reasonably sure that the plated surface, while slightly dulled, will still be intact. Maybe what this firm has done could stand out as an example of what you, too, could do if you applied yourselves seriously to the problem of the elimination of porosity in your own plated products.

Let us suppose that we just happened to find ourselves in the automotive center called Detroit. Meeting up with a friend he would ask, "How did you come out—by train or plane?," to which we would answer, "Oh, no. We drove out in our 1,000 h. p. Glutz Straight Sixteen." To this he might appropriately remark, "Well, why boast of your high rated horsepower when you know the thing won't climb hills?," and so somewhat paraphrasing this last remark we might also say to the whole electroplating fraternity, "Why boast of the protective value of your electrodeposited surfaces when you know that they are shot full of pores, or "holes" to you if you want it that way, and being so, just what do you propose to do about it?"

So very many people have said to us from time to time that they felt we attached too much importance to this thing called porosity, and was it really called for or warranted. Maybe you will all feel better satisfied that the subject warrants a lot of attention when we quote for you what one of this country's most highly respected and ablest authorities has to say on the subject, and so I will ask you to go with me on a little journey to Detroit, Mich., the date being December 7th, 1940, the place and occasion being the Fourth Educational Session of the Detroit Chapter of the American Electroplaters' Society, the title of the paper

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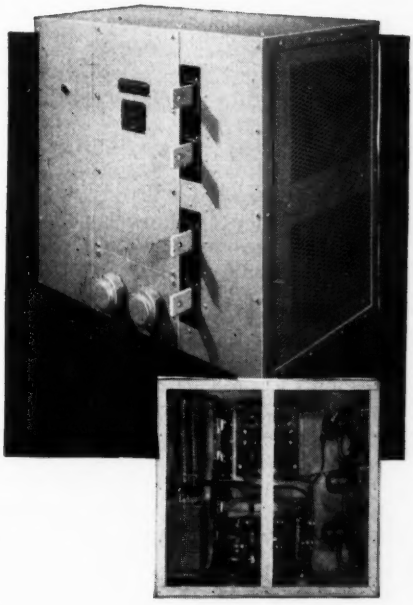

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presented being "The Application of Modern Science to the Electroplating Industry." The speaker was no less than Dr. Charles F. Kettering, Director of Research for General Motors Corporation, and this is what Dr. Kettering had to say:

"The same thing that spoils paint spoils plating. If you have little holes in your plating, you can spray a hose or salt spray on it all you want to and it isn't going to have any effect on it, but if you wet that plating or surface with dew, you will wet it from the bottom up since moisture enters as vapor, condenses and fills the crack. This destroys the finish. Despite all the big thick books that have been written, all that is needed to ruin the finish is to alternately heat and cool the surface in a normal atmosphere and thus cause moisture to condense and evaporate on the surface.

"These are just the 'fleas' that bother us all the time. We must never lose sight of the fact that there are lots of new things that are going to happen and all of them are in the years ahead."

And as if this were not enough, let us quote for you the opinion of another authority equally prominent in his field of work, and whose expressions are held in the highest regard by every member of the electroplating fraternity that we know, and again no less than Dr. William Blum, head of the Electrochemical Division of the United States Bureau of Standards, Washington, D. C. We asked Dr. Blum the question, "If we should say that all electrodeposited surfaces are porous, would that statement be true or false?" Dr. Blum's answer was, "As much as I would like to say no, the answer must be yes."

So there you have it plainly and simply and from two of the foremost authorities in the whole country. As to both, we refuse to yield first place to anyone in the degree of our admiration and respect for the vast area of research they have covered in the field of general production and electrochemical procedure. Dr. Blum is co-author along with another fine friend of ours, the very able Mr. George B. Hogaboom of New Britain, Conn., of the textbook "The Principles of Electroplating and Electroforming" which is used internationally wherever these principles are taught.

We wonder whether, should Dr. Kettering chance to read this discussion, he would agree that an appropriate barrel finishing operation to close these same "pores and cracks in a plated surface" might be considered as "one of the new things that is going to happen in the years ahead."

Important as is this matter of porosity of electrodeposited surfaces and thinking back, starting with 1937 when this series of discussions was inaugurated, it might be interesting to comment that down through this ten-year

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period we have received an average of close to six hundred letters per year, all having to do in one way or another with some phase of the electrodeposition of metals or the surface treatment of metals. In all of that correspondence we do not recall ever having received any letter, telegram, or even postal card from any responsible instructor in any college, university, institute, seminary, or other institution wherein the principles of electroplating or the surface treatment of metals is taught. We sometimes wonder just what these courses contain with regard to operations to eliminate conditions of porosity and for the prevention of the corrosion of the base metal to say nothing whatever of the effect of an appropriate barrel finishing operation to cold work the plated surface to greater hardness and for resistance to wear.

As to barrel manufacturers generally, we gladly praise their work when their work warrants praise, and we are equally frank in criticising them when we feel that criticism is warranted. It seems to us that it would be the normal function and all to the interest of barrel manufacturers generally if they would contact and explain to all of the instructors in electroplating that they could reach, the importance of barrel finishing procedure if for no other single reason than the most important one of the elimination of porosity in an electrodeposited surface. For them to do less than this is inexcusable for if they profit by their business ventures then they should be the ones to disseminate as far and as completely as possible all of the pertinent information of the value of barrel finishing procedure. The information should be supplied in such a way, using authorities of unquestioned recognition, that instructors would have no hesitancy in incorporating the information in their general course of teaching.

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How thick should an electrodeposited coating be to provide for resistance to corrosion of the base material on which it is deposited? Need the metal be as thick when the barrel finishing is employed as a part of the manufacturing process than when it is not? Well, suppose we take copper as an example. Without discussing its relative values as to malleability or ductility, we can say that it is an easy metal to deposit and it does respond very nicely to barrel treatment. Some platers answer the question by concluding that a thickness of 0.0001 inch is sufficient, others say 0.0002 inch, while others insist that 0.0003 inch is necessary. Our answer to this is that if 0.0005 inch of copper is well deposited, it will show far greater resistance when properly barrel finished subsequent to plating than either 0.001, 0.002 or 0.003-inch copper not so treated. The waste of metal and even more important the waste of production time between depositing 0.0005 inch of metal and either 0.001, 0.002 or 0.003 inch should provide a sufficient incentive to any manufacturer whose product is susceptible to finishing by the barrel method.

We wish that something might be done to bring into the barrel finishing fold the roughly 18 per cent of metal parts that should by all means be barrel finished but which are not so being treated. Actually the variation in production costs is such that even a small manufacturer depositing 0.0005 inch of metal and properly barrel finishing his parts can compete favorably with even the largest manufacturers who waste their metal and time in useless thick coatings which even in the last analysis fail to protect the base material due to the porous character of their surface.

We do not accept everything that our so-called economists tell us as gospel truth and much of it we take with the proverbial grain of salt, but at least in one respect we do agree and that is that in order to maintain our economic position we must create more goods for more people at lower production costs and thus lower prices on the open market to make those products available to more people at prices they can afford to pay. We can think of no better way to do this than for manufacturers of products that may be barrel finished to thoroughly investigate this field to learn just how far and to what effect they might adopt barrel finishing procedure in their operations. Our readers may feel sure that to this end PRODUCTS FINISHING will bend every energy to provide them with the best currently available information as to the selection of barrels, barrel finishing materials, and barrel finishing procedure.

To those manufacturers who may be skeptical and doubt the value of barrel finishing, let us suggest that you plate some parts with a 0.0005-inch

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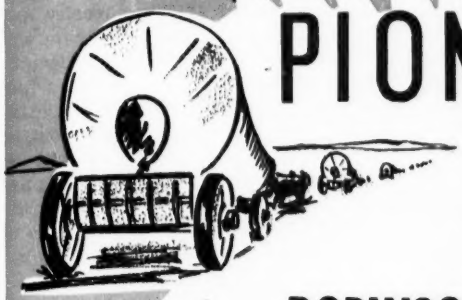

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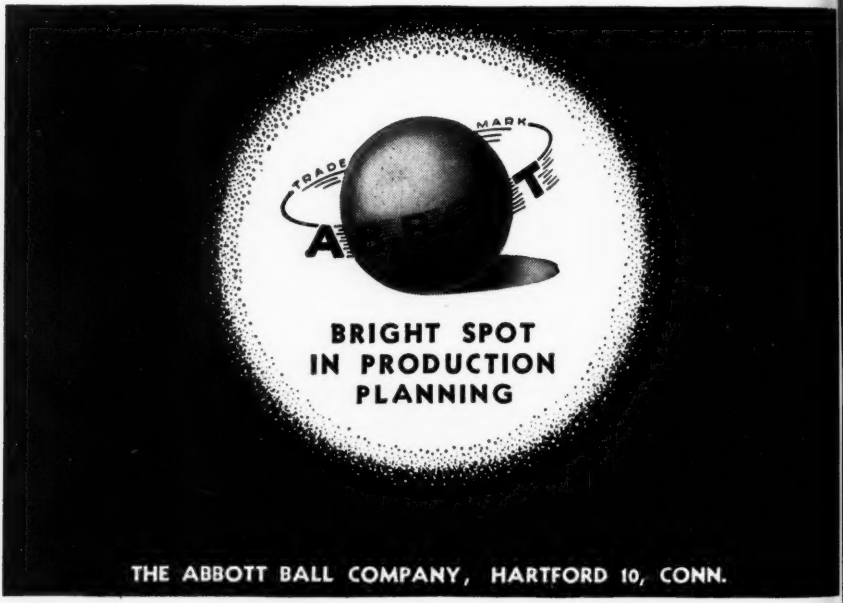
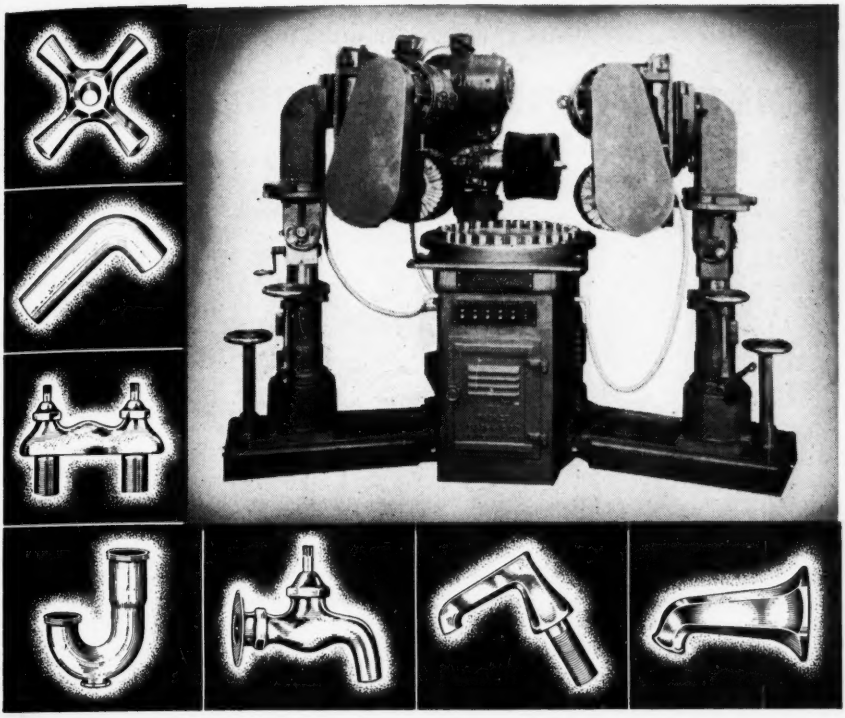
thickness of metal and have these properly barrel finished. Do half a dozen or more and send one to each barrel manufacturer who says to you in his advertising that he has an engineering department and invites you to use it. Just go ahead and take him at his word. He will finish the part and return it to you and when you get all parts back set them up on an outside exposure rack and along with them some more of the same parts that have been plated to a thickness of 0.001, 0.002 and 0.003 inch. You can do a world of things to help yourself to a better understanding of barrel finishing procedure and you'll learn more from these visual lessons than from anything we are able to write for you.

To go still further, if you like the salt spray test, salt fog test, salt mist test, or any other test you have ever heard of, then submit the parts to that test. If you operate a plating department, then we simply say to you that however thin you can manage to deposit the plate, we of barrel finishing will process it and iron it out even thinner than you deposit it, adding to it the properties of non-porosity and cold - worked hardness that you will never achieve by any means known to this time. Maybe, if we keep pounding away, the time may come sooner rather than later when the champions of electrochemical procedure will be agreeable to admitting that there are other methods that have value in the general classification which we like to term the surface treatment of metals.

"Hour Saver—Dollar Maker" is the title of a booklet containing complete information on Wrinkle finish applications which is now being distributed by New Wrinkle, Inc., 137 N. Perry St, Dayton 2, Ohio. Illustrated with photographs from production, the booklet is available free to executives addressing requests on their company letterheads.





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Electroless Plating on Metals by Chemical Reduction

The information presented in this article was prepared by the Technical Reports Section of the National Bureau of Standards.

A NEW method for plating nickel and cobalt on metal surfaces without the use of electric current has been developed by Abner Brenner and Grace E. Riddell of the National Bureau of Standards. This process, known as electroless plating, is brought about by chemical reduction of a nickel or cobalt salt with hypophosphite in hot solution. The reaction is catalytic, and, under the prescribed conditions of concentration and pH, no plating occurs unless certain metals, such as steel or nickel, are introduced in the bath. The reduction then occurs only on the surface of the immersed metal with the production of an adherent coating of 93 to 97 per cent purity.

Photomicrographs of deposits obtained in this manner show both a laminar and a columnar structure, similar to bright nickel electrodeposits, as illustrated in Fig. 1. The electroless deposits are of good quality—sound though brittle, and usually bright. Since they can be made as hard as tool steel, the method may prove useful where hard, wear-resistant surfaces are required, as in bearings. The process is particularly applicable to the plating of recesses, irregular-shaped objects, and enclosed areas such as tubes, where a centered inter-

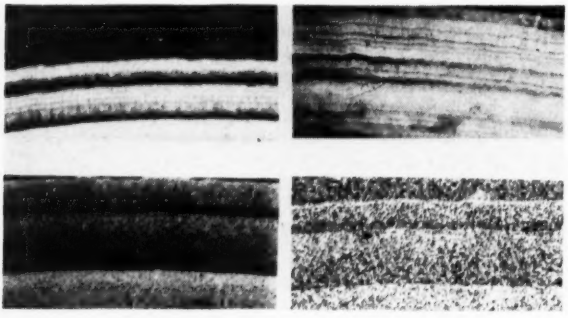

Fig. 1—Photomicrographs of "electroless" nickel deposits from acid solution. Upper left, nickel as deposited, showing laminations and columnar structure; hardness 500 (Knoop scale). Upper right, after annealing at 400 deg. C. for 30 minutes, producing maximum hardness of 800. Lower left, after annealing at 600 deg. C. for 30 minutes, showing precipitation. Lower right, after annealing for 30 minutes at 800 deg. C., showing excessive precipitation; hardness 470.

Fig. 2—Nickel plating on a steel strip at the National Bureau of Standards without the use of electric current. This new process, known as *electroless plating*, produces a high-purity adherent coating of nickel or cobalt on metal surfaces. It involves the chemical reduction of a nickel or cobalt salt with hypophosphite through the catalytic action of the metal upon which deposition occurs. The equipment, consisting of glass vessel, solution, and immersion heater (projecting from the bath), is simpler and more easily set up than that required for electroplating.

nal electrode with special current leads would be needed in electroplating.

As shown in Figs. 2 and 3, the equipment is simple and more easily assembled than that required for electroplating. No generators, rheostats, special racks, or contacts are necessary. Small parts which cannot be barrel-plated economically are readily plated by the electroless process if suspended by a string or in a bag affording ample exposure of the metal surface to the solution. There is no need of constant motion, as in barrel plating, since current distribution is not involved in any way.

While electroless deposits of cobalt and cobalt-nickel alloys have been obtained only from ammoniacal solutions, nickel can be deposited from either acid or alkaline solutions. The reactions, requiring a temperature above 90 deg. C. are given in the following equations (in which cobalt may be written for nickel):

$$NiCl_2 + NaH_2PO_2 + H_2O \rightarrow Ni + 2HCl + NaH_2PO_3$$ or

$$NaH_2PO_2 + H_2O \rightarrow NaH_2PO_3 + H_2$$

The first reaction is the important one, resulting in the deposition of nickel; the second reaction tends to lower the efficiency of the process through oxidation of the hypophosphite.

Fig. 3—Standard electroplating equipment in the electroplating laboratory at the National Bureau of Sandards. The apparatus, consisting of switchboard, battery, electrodes, lead wires, and solution, is more elaborate than that used in electroless plating.

Table 1
Suggested Compositions for the Various Electroless Solutions

	Nickel		Cobalt	Cobalt-Nickel
	Alkaline	Acid		
	g./l.	g./l.	g./l.	g./l.
Nickel chloride, $NiCl_2 \cdot 6H_2O$	30	30		30
Cobalt chloride, $CoCl_2 \cdot 6H_2O$			30	30
Sodium hypophoshite, $NaH_2PO_2 \cdot H_2O$	10	10	20	20
Sodium citrate, $Na_3C_6H_5O_7 \cdot 5\frac{1}{2}H_2O$	100		35	
Rochelle salt, $NaKC_4H_4O_6 \cdot 4H_2O$				200
Sodium hydroxyacetate, $NaC_2H_3O_3$		50		
Ammonium chloride, NH_4Cl	50		50	50
Alkali for neutralizing	NH_4OH	NaOH	NH_4OH	NH_4OH
pH	8-10	4-6	9-10	8-10
Rate of deposition, mm./hour	0.008	0.015	0.015	0.015
Rate of deposition, inch/hour	0.0003	0.0006	0.0006	0.0006
Appearance of deposit	Bright	Semi-bright	Dull	Semi-bright

A unique feature of the electroless process is the catalytic initiation of the reaction by the following metals: iron or steel, nickel, gold, cobalt, palladium, and aluminum. Unless one of these metals is introduced into the solution, no reaction takes place. Once started, the reaction continues at the metallic surface and only rarely occurs in other parts of the bath. For this reason, the containing vessel should be of glass, plastic, or other noncatalytic material.

Objects to be plated are cleaned by any of the accepted procedures and are given an acid dip before being suspended in the hot solution. The rate of deposition is about the same as in barrel electroplating, ranging from 0.0002 to 0.0008 inch per hour, depending upon the type of solution used. During the process, the pH must be kept within a certain range, and, if the operation is of long duration, the nickel salt and hypophosphite are replenished at regular intervals.

The composition of the plating bath may vary within rather wide limits. Suggested solutions are given in Table 1. In addition to the metal ions and hypophosphite, the alkaline solutions contain (1) hydroxycarboxylic salts and ammonium salts to prevent precipitation of the metal salts, and (2) certain alkalies to regulate the pH. In the acid nickel solutions, organic acids are used as buffers.

Electroless plating on noncatalytic metal surfaces may be accomplished in two ways. If a film of palladium or rhodium of nearly monatomic thickness is first applied by chemical replacement on a noncatalytic metal, deposition of nickel or cobalt will occur on the activated surface. Electroless plating of copper may be carried out in this way. A second method of initiating the reduction is to bring a less noble metal, such as iron or aluminum, in contact with the noncatalytic metal while it is immersed in the hot electroless solution. Once the process has been started, it continues because of the catalytic action of the initial deposit.

As formed, the electroless nickel deposits are brittle but become ductile when heated. These deposits are harder than the ordinary electrodeposited nickel, and upon heating their hardness is still further increased. This is in contrast to the behavior of "hard" electrodeposited nickel, which has high initial hardness but softens upon

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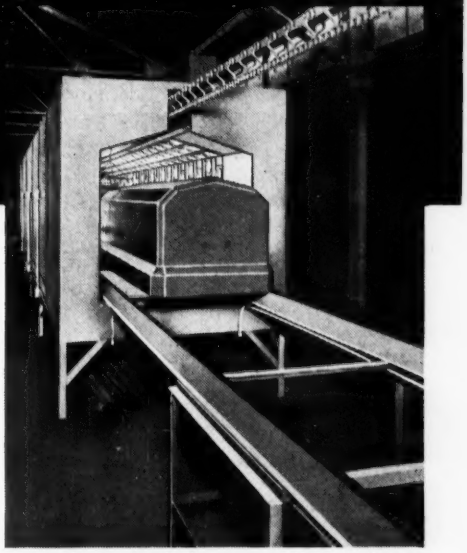

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heating. The hardening may be explained as "precipitation hardening," probably of phosphides.

The adhesion of the nickel deposit to mild steel is such that it cannot be flaked off by bending, but on high-carbon steel this property is less satisfactory. In salt-spray tests on steel coated with 0.0002, 0.0005, and 0.001 inch of electroless nickel, in comparison with similar panels coated with electrodeposited nickel, the protective value of the two types of coatings was virtually the same. However, the electroless cobalt does not compare so favorably with the electrodeposited cobalt.

The yield or efficiency of the reduction based on the decomposition of hypophosphite is 37 to 66 per cent for nickel and cobalt, respectively. About 2 grams of nickel or nearly 4 grams of cobalt are reduced by 10 grams of sodium hypophosphite. Because of the moderate yield and the present high cost of sodium hypophosphite, the process is expensive. Extensive commercial use of electroless plating is thus dependent upon a reduction in the price of this chemical.

Note: Recent developments in electroless plating were presented in a paper at the convention of the American Electroplaters' Society in Detroit on June 23, 1947. Earlier phases of this work have been reported in Bureau Research Paper RP 1725, "Nickel Plating on Steel by Chemical Reduction," Abner Brenner and Grace E. Riddell, J. Research NBS 37, 1 (1946).

"Planned Systems" is the title of a 12-page illustrated technical bulletin published by Peters-Dalton, Inc., 17908 Ryan Rd., Detroit 12, Mich., which outlines most of the basic points to be considered in the planning of a complete organic finishing system. Data are presented on metal cleaning and rust-proofing equipment, dry-off ovens, spray booths, filtered air supply systems, drying and baking ovens, and overspray reclaiming systems.

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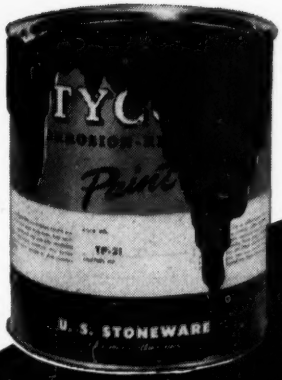

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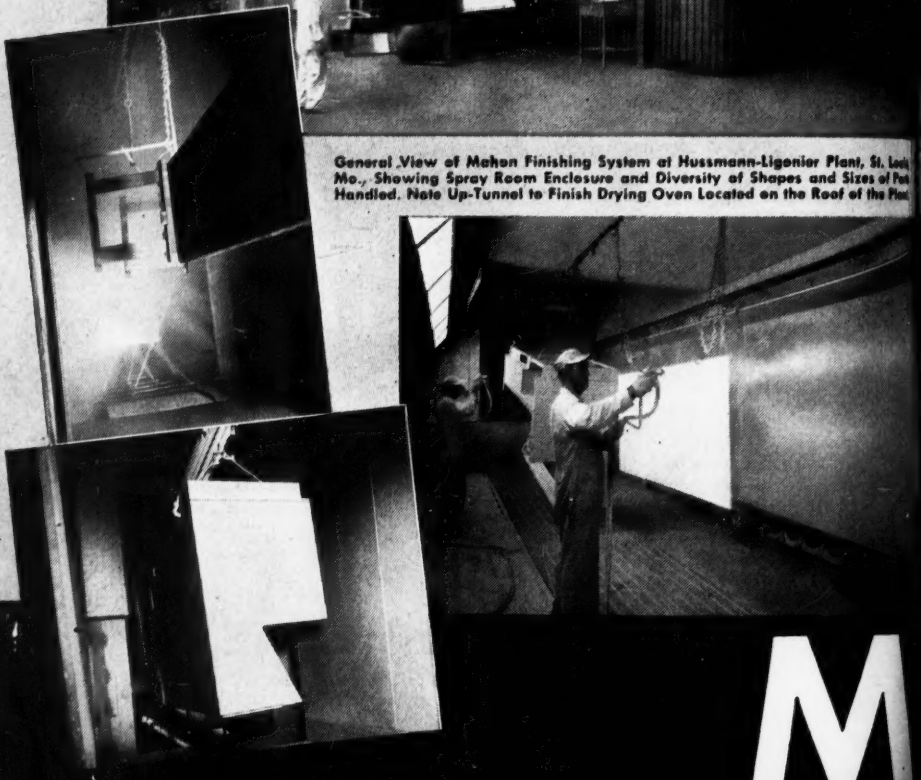
General View of Mahon Finishing System at Hussmann-Ligonier Plant, St. Louis, Mo., Showing Spray Room Enclosure and Diversity of Shapes and Sizes of Parts Handled. Note Up-Tunnel to Finish Drying Oven Located on the Roof of the Plant.



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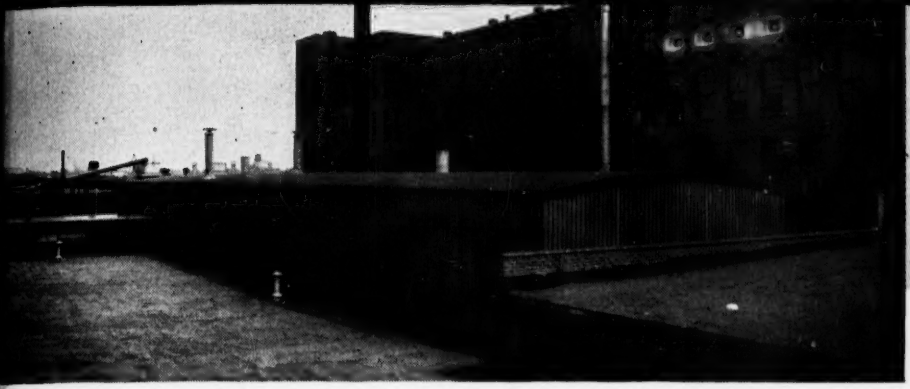

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Some recent developments in high-solids metal lacquers were discussed by J. K. Speicher, Hercules Powder Company, before the Spring Meeting of the Protective Coatings Division, The Chemical Institute of Canada, in Montreal. According to Speicher, of the various problems in the lacquer industry, that of increasing the solids content is without doubt of greatest importance. The history of lacquer since its earliest days has been a record of increasing solids content and increasing use of lacquer going hand in hand. The problem will

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continue to be of importance and will continue to be a subject of research until the time comes when the volatile content of lacquers is a very minor quantity.

One phase of the problem which ought to be obvious, but which is frequently overlooked, and which was reviewed by Speicher for purposes of emphasis, is the rather large saving in solvent which is effected with a relatively small gain in solids content. For instance, with a 20 per cent solids lacquer, four pounds of solvent are used to lay down one pound of solids, whereas with a 25 per cent solids lacquer only three pounds of solvent are used for the same one pound of solids. It doesn't sound tremendously important to say that one has increased the solids content of a lacquer 5 per cent. It sounds much more important when one says, instead, that he has saved a fourth of the solvent that would have been used, or if he says that he has saved a pound of solvent for every pound of solids laid down.

Many lacquer formulators are inclined to belittle an increase in solids content unless it is sufficient to eliminate one coat from the finishing schedule. They argue that unless a three-coat job can be reduced to a two-coat job or perhaps a two-coat job to a one-coat operation, no significant saving has been made. Obviously, such a reduction in time and labor of applying the lacquer is most desirable and is an ultimate goal of high-solids development, but, as proposed by Speicher, the lesser gains made on the way should not be scorned. Applying the same amount of solids with a lesser amount of solvent is one such gain; another is in the cost of manufacture. In many cases, it is possible with given plant facilities to turn out as much high solids lacquer as is possible with low solids lacquer.

According to Speicher, the problem of increasing lacquer solids was approached at the Hercules Experiment Station several years ago with the idea in mind that any increase in solids would be a fundamental gain, and that various paths would be followed to determine how much gain could be obtained by each and whether these separate gains could be combined to achieve a large composite gain. The logical methods of increasing solids were pointed out to be as follows: (1) to use a rich solvent mixture which will tend to give a lower viscosity at any particular solids concentration than would a leaner mixture; (2) to use the hot spray technique which reduces the viscosity of a high-solids, high viscosity lacquer to a workable level by heating the lacquer at the time it is sprayed; (3) to use a lower-viscosity nitrocellulose; (4) to use resins which (a) in combination with nitrocellulose will give low-viscosity solutions, and (b) can be used in high proportions relative to the ni-

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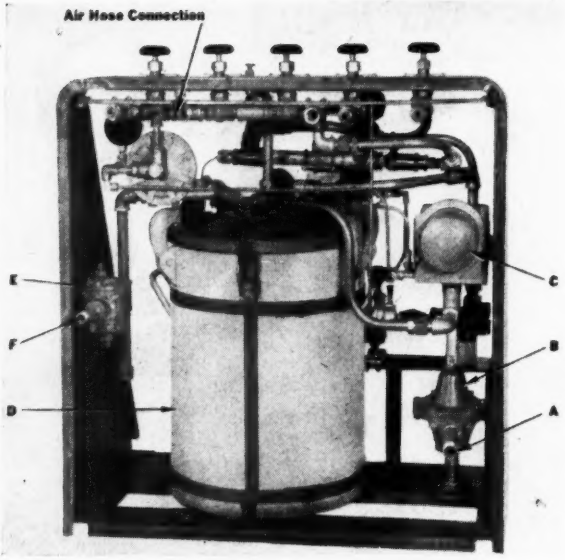

Fig. 1—Material heating and circulating equipment for the application of finishing materials at elevated temperatures (rear view with cabinet removed). A—steam inlet. B — steam pressure regulator. C — temperature controller steam valve. D — heat exchanger for transfer of heat to material. E — steam condensate trap. F—steam condensate outlet. *(Photo courtesy The DeVilbiss Co., Toledo, Ohio)*

trocellulose and still yield lacquers that are durable.

High Solvency. The use of a rich solvent permits a very definite increase in solids at any given spraying viscosity as compared to lean solvent mixtures. This principle, sometimes referred to as "high-solvency solvent," according to Speicher, is now being used in many lacquers and the trend in lacquer formulation is toward richer solvent mixtures even where the extreme in high solvency is not used.

In addition to the actual increased solids obtained at any given viscosity, it has been found possible to spray high-solvency lacquers at higher than normal spraying viscosity, thus pyramiding the increase in solids. The richest solvents are low boilers like methyl acetate and methyl ethyl ketone. With these fast evaporating solvents, very heavy coats can be applied without encountering sagging or undue orange peel. On the basis of these findings, the subsequent studies at Hercules on solids formulation were all with a high solvency solvent composed (by weight) of butyl acetate 20 per cent, butanol 10 per cent, ethanol 5 per cent, ethyl acetate 10 per cent, methyl ethyl ketone 25 per cent, and toluene 30 per cent.

Hot Spray. Hot spraying also permits much higher than normal solids content but obviously this increase cannot be combined with that produced by high solvency since the high-solvency solvents are too low boiling to hot spray. According to data presented by Speicher, a typical solvent for hot spraying is butyl acetate 37.5 per cent (by weight), butanol 22.5 per cent and xylene 40 per cent. One typical application of hot-spray lacquer has been in airplane finishing.

Shown in Fig. 1 is the commercial apparatus developed by The DeVilbiss Company for the application of finishing materials at elevated temperatures. It has been found that by spraying very viscous materials (up to 500 seconds, No. 4 Ford cup, such as airplane dopes, varnishes, lacquers, paints, and oils at elevated temperatures, heavier coats can be applied without runs or sags, reducing the number of applications required and thus effecting a saving in labor and material.

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pany, experience with materials up to 500 seconds' viscosity has been satisfactory if the materials were heated from 165 to 200 deg. C. and sprayed at pressures assuring desired atomization. However, due to the varying grades and ranges of viscosity of the finishing materials on the market, definite rules regarding temperature of the material or spraying pressures cannot be set up with any certainty and should be determined by either actual test or based on the recommendations of the material manufacturer. In order to cover the variations, the DeVilbiss equipment has adjustments for temperature, fluid pressure, flow of material, and so on. Temperature may be regulated between 110 and 200 deg. F.; fluid pressure can be adjusted from 20 to 80 pounds, depending on the viscosity of the material in the heated state; fluid flow can be regulated from 1 pint to approximately 8 pints per minute by varying the speed of the air motor which drives the material pump.

Nitrocellulose Viscosity. Up until now nitrocellulose of ¼-second viscosity has usually been considered the lowest-viscosity type suitable for outdoor metal lacquers, and sometimes the ½-second viscosity material is preferred. Data presented by Speicher, based on exposure tests of two years' duration, indicated that with certain selected formulations, nitrocellulose of considerably lower viscosity, such as 18 to 25 cp., could be used satisfactorily with a corresponding increase in solids. This gain in solids content can be combined with that obtained either by high solvency or hot spray and is closely related to choice of resin and the proportion of resin content used.

Resin Content. According to Speicher, the selection and correct proportion of resin required the most extensive investigation of all methods studied for increasing solids in lacquers in

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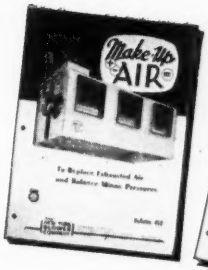

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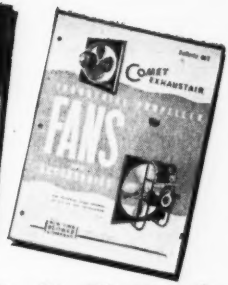

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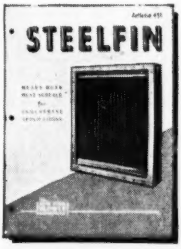

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the work carried out at Hercules. The results showed that a reasonably high solids content lacquer, together with good durability and generally satisfactory properties, could be obtained using two parts of a non-oxidizing alkyd resin to one part of nitrocellulose. Modifications of this combination can be made by adding small amounts of urea or melamine resins or not more than one part of an oxidizing-type alkyd. Another modification is to use some plasticizer and a lesser amount of resin.

According to Speicher, all of the above values are based on lacquers made from RS nitrocellulose of ½-second (105 to 140 cp.) viscosity. Similar tests were made with SS nitrocellulose of ½-second viscosity and with RS nitrocellulose of ¼-second (45 to 55 cp.) viscosity. Also, the very low viscosity type of 35 to 55 cp. and 18 to 25 cp. viscosity were investigated. It was reported that the use of the SS instead of the RS nitrocellulose leads to somewhat more rapid chalking, especially in whites. Also, it was reported that the use of viscosity types lower than the ½-second provides increase in solids but limits the variety of formulations which afford satisfactory durability.

An example cited is that the use of a 2:1 resin to nitrocellulose ratio with a typical alkyd and a high viscosity solvent will provide clear lacquers having a viscosity suitable for spraying (80 cp.) and a solids content of 25.3 per cent with ½-second nitrocellulose, 28.8 per cent with ¼-second nitrocellulose, 29.5 per cent with 30 to 35 cp. nitrocellulose, and 31.4 per cent with 18 to 25 cp. nitrocellulose. In comparison, if the nitrocellulose is kept constant at ½-second viscosity and the solids content is raised by increasing the resin ratio, one obtains at 2:1 ratio, 25.3 per cent solids; at 3:1 ratio, 28.2 per cent solids; and at 4:1 ratio, 30.2 per cent solids. The 4:1 ratio is entirely too soft for most uses and even the 3:1 ratio is on the soft side. According to Speicher, if the 3:1 ratio is not too soft for the intended use, one can go to ¼-second nitrocellulose and carry the solids up to 33.0 per cent.

Hardness and Durability. It was pointed out by Speicher that the limits one can go in increasing the solids content by increasing the resin ratio depends on the hardness required. Alkyd resins of the type used in or suitable for use in lacquer vary greatly in hardness, depending on the oil length and the type of oil, but are for the most part rather soft. Accordingly, with large proportions of resins, the lacquers may be soft. For many uses of metal lacquers, such as on automobiles, the lacquer must have, in addition to good weather resistance, considerable hardness to withstand not only sanding and polishing but also the abuse received in normal use.

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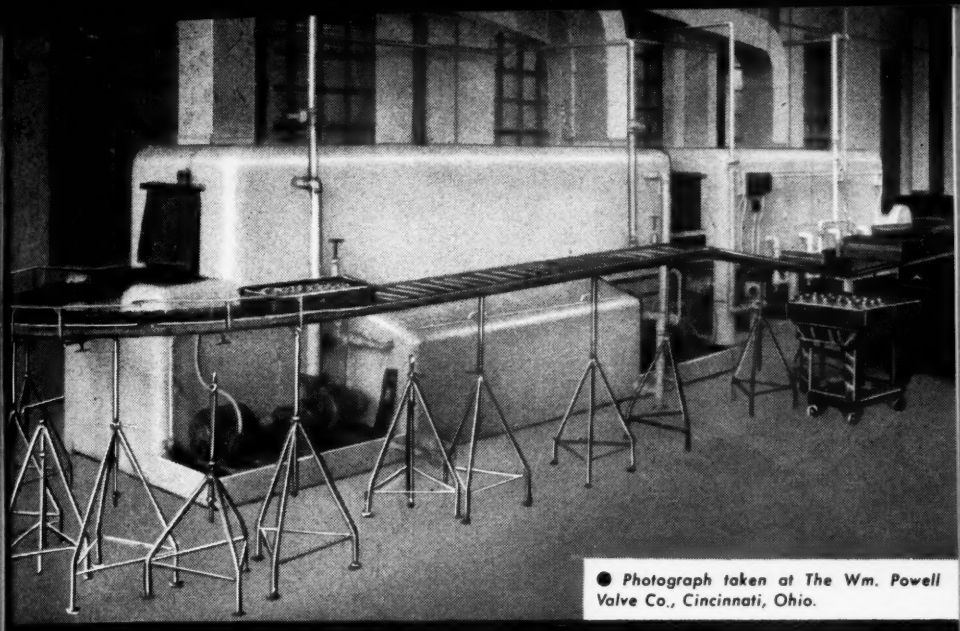

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Fig. 2—Typical sprayroom setup for the application of finishing materials (*Photo courtesy The DeVilbiss Co., Toledo, Ohio*)

Typical application technique for metal lacquer is illustrated in Fig. 2. Thus, according to Speicher, one might say that a Sward hardness under 20 indicates a definite limited usefulness. (See Fig. 3 for illustration of Sward Hardness Rocker.) Data were presented to show that by additions of relatively small amounts of urea or melamine resins, hardness of the lacquer can be maintained at a fairly high resin ratio and an increase in solids obtained along with good durability. Finishing engineers will certainly want to follow future developments in high-solids content nitrocellulose lacquers for increasing the usefulness and efficiency of this versatile finishing material.

* * *

Determination of Traces of Copper Impurities in Nickel Plating Baths

NICKEL plating solutions play an integral part in many finishing processes and require constant attention with respect to degree of purity and concentration for optimum operating results. One factor which demands attention in modern bright nickel plating processes is the determination and control of soluble metallic impurities which may be introduced in the bath. To facilitate such control, rapid accurate methods of detection and analysis are desirable. One impurity which may produce harmful results when present in excessive amount in nickel plating baths is copper; its presence may result in a dark-colored hard-to-buff deposit, and has been reported to be extremely detrimental to the luster obtained in certain bright nickel deposits, especially at low current density points of the article. It has also been reported that copper impurities may be the cause of nickel pitting in a low pH Watts type bath ("The Monthly Review," Am. Electroplaters' Soc., 19, 9, 1932).

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method for the determination of traces of copper in nickel plating baths. According to the method, which was reported by E. J. Serfass, Project Director, Lehigh University, and W. S. Levine, Associate, copper is isolated from the other constituents in the nickel plating bath by precipitation with 2-mercaptobenzothiazole and extraction of the precipitate with amyl acetate. The color is then developed by

Fig. 3—Sward Hardness Rocker for testing the hardness of a finish

addition of dibutyl amine and carbon disulfide. After the solution has been diluted to 25 ml. with ethyl alcohol, its transmittancy is measured using a Klett-Sommerson colorimeter with blue filter No 42. A recommended routine procedure has been developed which is reported to provide an average accuracy of about 5 per cent (see also "The Monthly Review," April 1947).

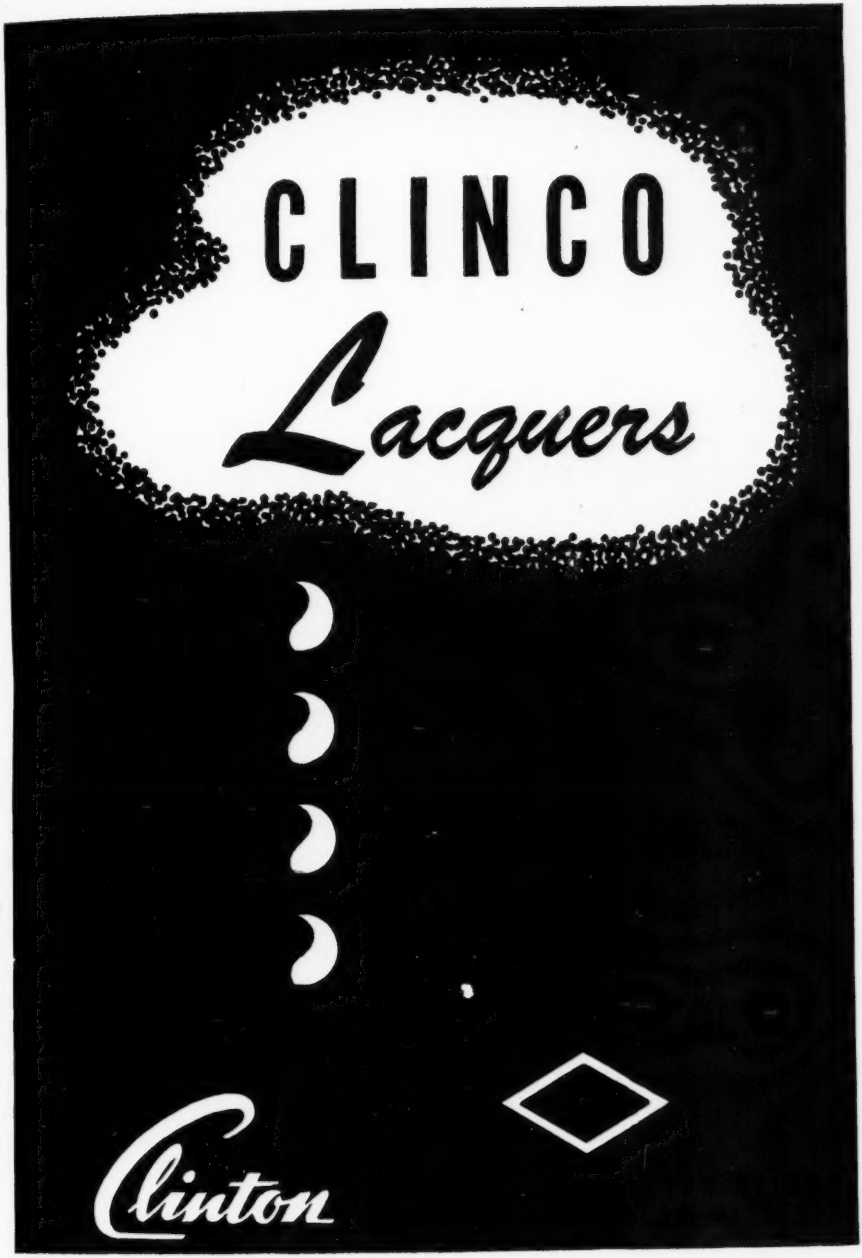
* * *

Proper Control of Pickling Operations Important in Many Finishing Operations

ALTHOUGH pickling may appear to be a process in the finishing department, certain refinements and modifications, as well as the use of proper control of the solution by analysis, in many instances may contribute to the overall efficiency of this operation. Pickling is the general term applied to the chemical removal of surface oxides from metal by immersion in an acid solution. Wide variations are possible in the strength, temperature, and type of acid solutions used, and the ultimate procedure depends upon the material to be pickled, the character of the scale involved, and the surface desired after pickling.

Low carbon, hot rolled steel is generally pickled in approximately 10 per cent sulfuric acid. The trend in recent years has been toward lower pickling temperatures, around 150-160 deg F., resulting in economy in steam consumption and in better quality of the finished product. Where low carbon steel is pickled for enameling, galvanizing, or tinning, special precautions are necessary to ensure a surface which is chemically clean, as well as free from scale. In the pickling of all ferrous metals, it is obvious that the dissolutions of the scale and a little of the base metal results in the accumulation of ferrous sulfate in the bath. Acid attack on the metal is generally undesirable and is held to a minimum by the use of inhibitors. As would be expected, the pickling rate decreases as the acid in the bath is consumed, and the rate is maintained by additions of fresh acid from time to time. Pickling rate also decreases as the concentration of ferrous sulfate increases and, finally, the spent liquor must be discarded and a fresh bath prepared.

Testing of pickling solutions is an important part of pickling control and one that is frequently overlooked. Pickle tanks should be sampled regularly. Efficient control of the pickling operation thus requires a reasonably accurate analytical procedure that is simple enough to be used by the average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semi-skilled workman. Recent advances in control and disposal of pickle liquors have been made as a result of the multiple industrial fellowship which the Stream Polution Committee of the American Iron and Steel Institute has sustained at Mellon Institute. It is reported that in a number of mills the fact that pickle liquor contains a small amount of ferric iron forms the basis for a routine determination of free sulfuric acid. A sample of the liquor is pipetted into a flask, a few drops of potassium thiocyanate solution added, and the sample titrated with sodium hydroxide to the disappearance of the red color. The sodium hydroxide is standardized at such a value that the burette reading is numerically equivalent to grams of sulfuric acid per 100 c.c. of solution (see also "The Iron Age," July 3, 1947).

Ferrous iron is determined by titrating a sample with dichromate, using diphenylamine as an internal indicator. The effect of ferric iron is masked by the addition of about 10 c.c. of a solution consisting of 150 c.c. sulfuric acid and 150 c. c. phosphoric acid made up to a liter with water. To this titration mixture 15 c.c. of indicator solution is added (1 g. diphenyl amine in 100 c.c. conc. sulfuric acid). Since the ferrous iron in the liquor is equivalent to the sulfuric acid consumed, the dichromate may be standardized so that the burette reading is numerically equivalent to the grams of sulfuric acid consumed per 100 c.c. of liquor.

Determination of ferrous iron by titration with permanganate is sometimes preferred since this reagent serves as its own indicator. Total iron may also be determined rapidly and accurately by the Zimmerman-Reinhardt method. A rapid method for the determination of sulfates, yielding results accurate to 0.2 per cent, depends on the insolubility of hydrated iron

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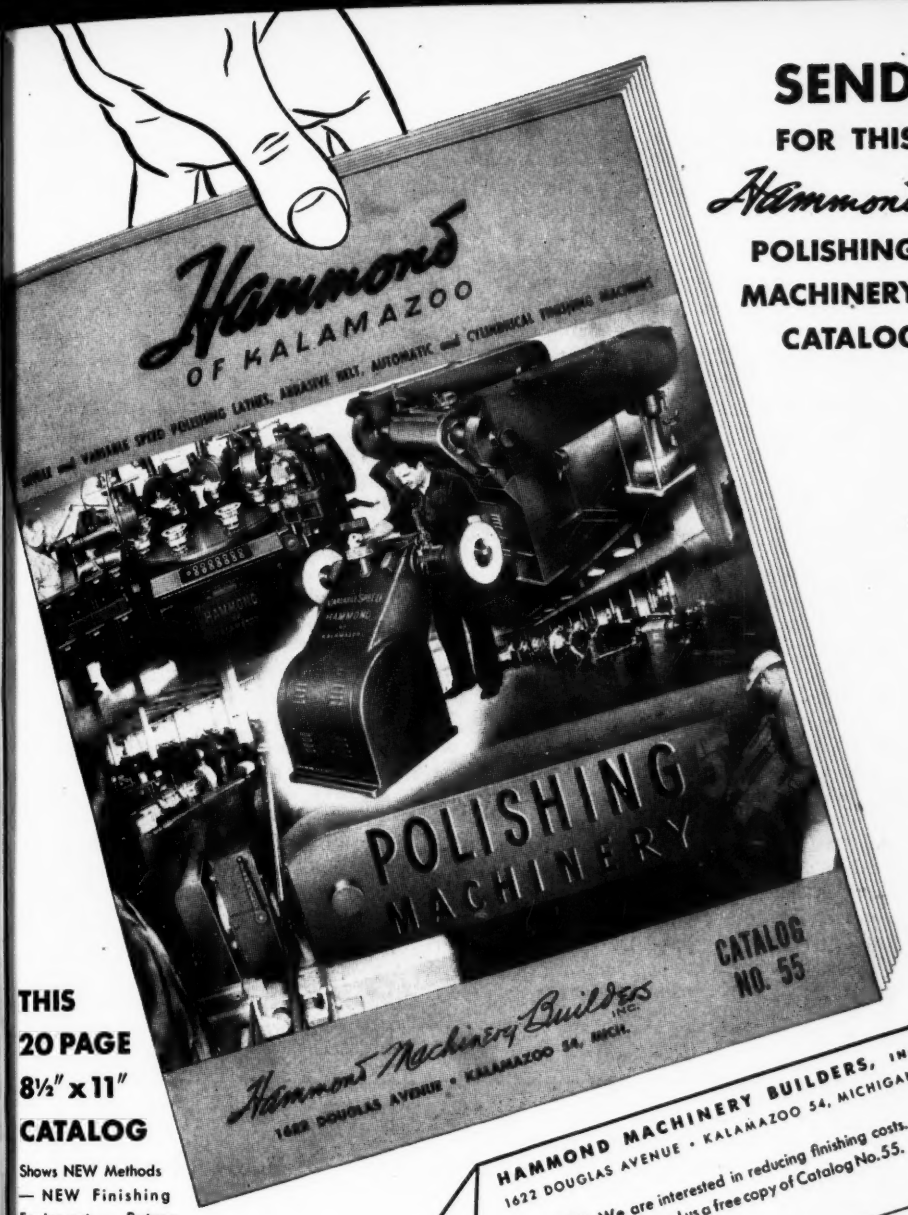

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oxides in excess alkali. This method has been found more accurate than the time-consuming gravimetric procedure. An excess of 0.5N sodium hydroxide is added to the sample of pickle liquor, the mixture heated to boiling, and an aliquot of clear supernatant liquid taken for titration of excess sodium hydroxide. Using this value, the net sodium hydroxide consumed is calculated to grams of sulfate ion per liter.

The most common method for pickle liquor disposal is treatment with lime and discharge of the slurry to a subsidence basin. Limes and limestones may vary in their reactivity and available basicity for such treatments. Thus, the basicity of a lime under a given set of conditions to be used in the treatment process may be determined quickly by heating a sample with an excess of sulfuric acid and titrating the excess with sodium hydroxide.

In pickling for galvanizing or tinning, some plants use two pickling baths; first a 5-10 per cent solution of sulfuric acid in water at 150-180 deg. F., and second, a short time dip in a moderately strong solution of muriatic acid. When pickling sheets for galvanizing or finning, as little time as possible should elapse between pickling, rinsing, and coating operations. Should a delay occur between rinsing and coating, it is recommended that the material be stored under water and never allowed to dry. Contact of the moist iron with air will produce rusting. In addition, any ferrous salts from the pickling bath which dry on the work become oxidized and difficult to remove.

Vigorous mechanical agitation of the pickle bath is considered generally desirable. When the pickle solution is allowed to remain stagnant, gas pockets tend to form which keep the acid out of contact with the metal and cut down the pickle action on these areas. Thus, when the steel is galvanized or otherwise coated, these scale-retaining areas may remain uncoated. Agitation also assists in obtaining uniform acid concentration throughout the bath, thereby providing a more uniform rate of pickling.

Care should be taken to avoid overpickling in finishing operations. Overpickling may be recognized by porosity of the transverse surfaces and a roughening of the whole surface, with discoloration and decrease in size and weight. These conditions can be avoided by removing the material from the bath promptly when pickling is complete. Uniform cleaning of the material to be pickled is also an important factor. Inhibitors aid in preventing overpickling, but will not completely prevent its occurrence.

* * *

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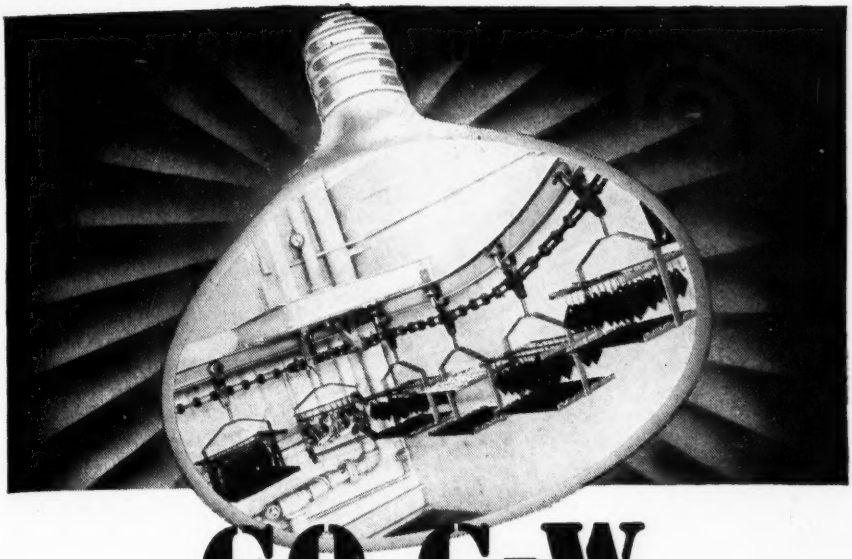

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Regional Research Laboratory before the Division of Paint, Varnish and Plastics Chemistry at the Atlantic City meeting of the American Chemical Society, the properties of coatings and films of allyl starch are such that it may find valuable use as a protective coating material. Allyl starch is a reaction product of starch and allyl chloride or allyl bromide; the reaction

Fig. 4—Coated steel exhaust stacks tested simultaneously under use conditions for 300 hours at high temperature. Stack on left was coated with special National Bureau of Standards ceramic coating and is undamaged. Stack on right, coated with a type of commercial enamel, shows some failure spots, with rusting occurring at the broken spots in the coating.

product is soluble in a large number of organic solvents, and the resulting solutions may be characterized as an evaporative-drying, oxidative-hardening coating material. When suitably formulated, it is reported that lacquers produced from the reaction product will dry free from tack in 5 minutes and are sufficiently hard within 24 hours at room temperature drying conditions to permit sanding or rubbing. The allyl starch coatings are also reported to be heat reactive; they respond to curing in 2 to 4 hours at 100 deg. C. and 15 minutes at 150 deg. Centrigrade.

Air-dry coatings of unmodified allyl starch exhibit an abnormal tendency to shrink and crack soon after application. It was reported that as little as 10 per cent plasticizer will prevent this shrinkage, based on a new type of laboratory shrinkage test which was devised. Cured films of the unmodified product have a tensile strength such that a 3 to 4-pound weight is required to break a test strip 0.5 inch wide by 0.001 inch thick. The elongation at the breaking point is about 6 per cent; however, modification with plasticizing resins results in considerable improvement in the distensibility. An example cited was that 2 parts of allyl starch to 1 part of non-drying alkyd resin produces a cured film which has very good abrasion resistance.

* * *

High Temperature Protection of Steel with Ceramic Coatings

A NEW type of ceramic coating for the protection of mild steels in high-temperature service was developed during the war at the National Bureau of Standards and was used by the Army and Navy on the exhaust systems of certain aircraft and other vehicles. Laboratory and service tests have shown the ceramic coatings to be ideal for high temperature service. The outstanding features of the coatings are (1) high resistance to chipping under repeated thermal shock, (2) protection of the metal against oxidation during prolonged exposure in air at temperatures up to about 1,250 deg. F., (3) freedom from cracking and blistering under conditions of high temperatures and severe thermal gradients, and (4) a mat surface that does not show highlights and, therefore, decreases the visibility.

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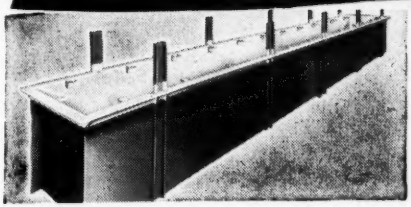

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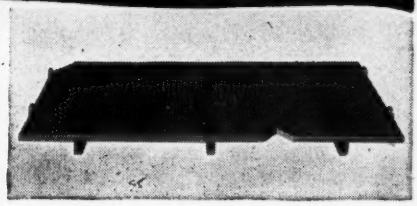

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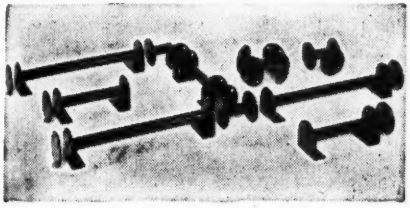

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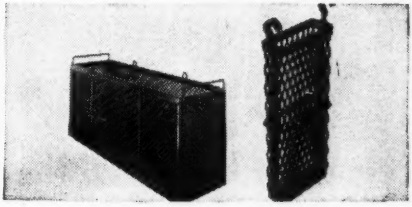

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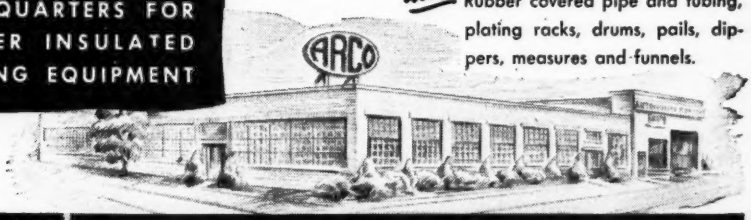

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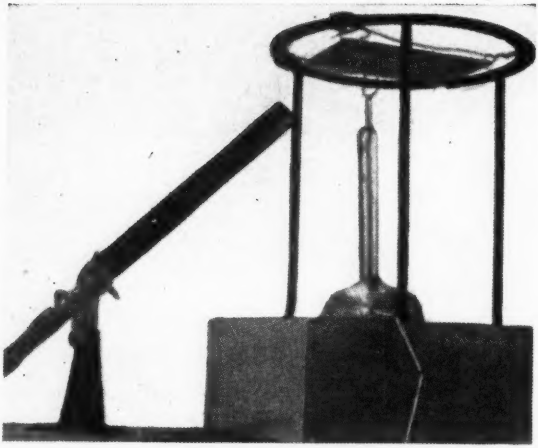

Fig. 5 — Equipment used for flame-impingement tests at National Bureau of Standards

steel in various military applications for exhaust systems, there are other possible finishing applications where the coatings might prove beneficial in prolonging the life of steel parts that are exposed to rather severe temperature conditions. Such applications would include domestic stove parts, such as grates or burners; industrial furnace parts, such as mufflers, dampers, or burners; parts for heat interchangers; heat baffles for continuous enameling furnaces; annealing boxes; and mufflers and tail pipes for buses, trucks, and automobiles.

To prepare these special ceramic coatings, a mixture of a special grade of calcined aluminum oxide and a conventional type of ground-coat frit is ground with water to appropriate fineness and is then applied to the metal, dried, and fired according to well-known methods. (Specific composition of coating mixtures are given in Research Paper RP1773, available from the National Bureau of Standards). The coatings may be applied to suitable shapes by spraying, but exhaust stacks and similar items having interior surfaces that require coating must be dipped. The firing temperature for the coatings on ordinary steels is 1,500 to 1,600 deg. F. The time of firing varies with the gauge of the metal, the size and shape of the piece, and the furnace used. For small pieces made of 18-gauge steel, the proper firing time was reported to be 4 to 5 minutes. The thickness of the fired coatings for one-coat applications should be 0.002 to 0.003 inch. Shown in Fig. 4 are coated steel exhaust stacks prepared using National Bureau of Standards special ceramic coating and also a conventional enamel coating. The special ceramic coating is undamaged after 300 hours of exhaust service, whereas the conventional enamel coating shows some signs of failure under the high temperature service conditions.

During the time that the development work was being carried out at the National Bureau of Standards on the ceramic coatings, work was also being performed to develop laboratory tests to indicate the suitability of the various coatings produced. One of these tests was the **flame-impingement test.** The specimens used in this test were 4 to 6 inches in size and the enamel was applied to both sides of the 18-gauge low carbon steel in thicknesses of 0.003 to 0.004 inch. A laboratory blast burner having an exhaust tube approximately $\frac{5}{8}$ inch in diameter and 3 inches in length was modified, as shown in Fig 5, by covering the mixing tube with an enameled cylinder 1 inch in diameter and 9 inches in length. This cylinder was adjusted at an angle of approximately 45 degrees to the horizontal plane in

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which the specimen was supported, the end being approximately 2½ inches from the specimen. A 22-gauge platinum-to-platinum 10 per cent rhodium thermocouple was placed at the center of the flame ¼ inch below the specimen. The air and blast were

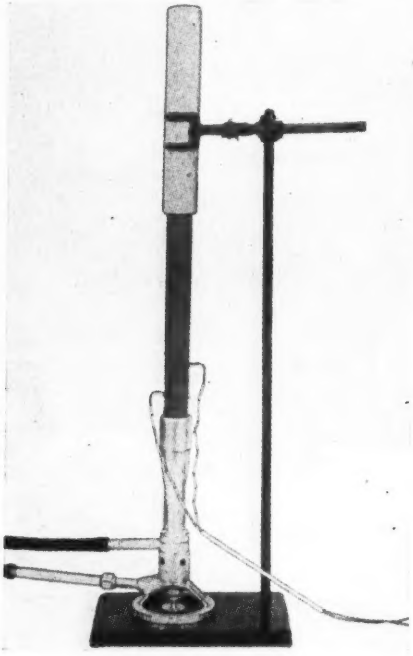

Fig. 6—Equipment used for determining resistance of ceramic coating to thermal shock by water spray at National Bureau of Standards

adjusted so that the thermocouple incated a temperature of 1,700 deg. ± 20 deg. F. with a specimen blank in position. When this condition was reached, the blank was removed and the flame allowed to impinge on a test specimen for 15 minutes, after which the specimen was examined on both sides. The coatings were examined for evidence of failure due to "crawling" in which the enamel separates leaving streaks of apparently unprotected metal.

A thermal-shock test by air blast was also carried out using a similar setup. The temperature of the specimen was allowed to increase rapidly until it reached 1,200 deg. F., at which time a blast of air at room temperatures was released on the underside of the specimen. This blast immediately blew out the flame and reduced the temperature of the test area to 400 deg. F. within a period of from 12 to 15 seconds.

A thermal-shock test by water spray was carried out using a tubular specimen 1 inch in diameter and 9 inches long, coated inside and out, which was mounted as shown in Fig. 6. A refractory tube, approximately 9 inches long, was placed at the top end of the specimen. By adjusting the air and gas supplies, the flame could be regulated to burn within the enameled metal cylinder for a distance of several inches above the burner. For temperature measurements, Chromel and Alumel wires were spot welded to the specimen, after grinding off small areas of enamel approximately ⅝ inch apart, at a level about 1½ inches above the top of the burner. At the beginning of the test, the air and gas pressures were so adjusted as to cause the flame to burn within the tubular specimen, the hotest area being at the level of the thermocouple. When the thermocouple indicated 1,200 deg. F., a controlled spray of water was directed at the specimen while the flame still burned inside the tube. The water spray was continued until the specimen was cool enough on the outside for the water to form a film over the area between the points of attachment of the thermocouple wires. This operation required from 12 to 15 seconds for different specimens. Each specimen was given five cycles of this treatment. Other heating and quenching tests were made. In addition, tests were carried out for thermal-shock by immersion in water. Also, as a meas-

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75 YEARS OF QUALITY AND SERVICE

ure of the degree of protection against oxidation of the metal provided by the new ceramic coatings, test specimens were heated for prolonged periods at constant elevated temperatures. The laboratory tests were followed by extensive service condition tests.

Phosphating. By L. O. Gilbert. Published by Hobart Publishing Co., Box 4127, Chevy Chase Br., Washington 15, D. C. 115 pages. Loose-leaf type binding, heavy paper covers. Price, $6.50.

One of a series of special technical reports made available through the Offices of Technical Service, U. S. Dept. of Commerce, and prepared by the Rock Island Arsenal during the war, this technical work is divided into two sections, Section I dealing with phosphate coatings, Type II, Class B, U. S. A. Spec. 57-0-2C. Section II deals with phosphate coating, Type II, Class A, U. S. A. 57-0-2C.

Section I is sub-divided into seven principal parts which are headed as follows: Preparation for Phosphating; Racking and Phosphating; Reagents Used in Chemical Analysis of Phosphating Solutions; Control of the Phosphating Solution (Manganese Base); Rinsing; Drying, Inspection and Oiling; and Maintenance of the Phosphating Tank and Accessories. These parts in turn discuss removal of oil and grease, rust removal and preparation of surface, racking of work, phosphating, control of the phosphating solution (zinc base), recommended concentration ranges, water rinsing, drying, inspection of phosphated parts, oiling, and sludge removal.

Section II is sub-divided into six principal parts which are headed as follows: Preparation for Phosphating; Racking and Phosphating; Reagents Used in Chemical Analysis of Phosphating Solutions; Rinsing; Drying, Inspection and Oiling; and Maintenance of the Phosphating Tank and Accessories. These parts in turn discuss removal of oil and grease, rust removal and surface preparation, pretreatment prior to phosphating, racking of work, phosphating, control of the phosphating solution (Type II, Class A), water rinsing, drying, inspection of phosphated parts, oiling, sludge removal, maintenance of accessories, cleaning of coils, and aid to cleaning of coils.

McKeon's
"Liquid Sulphur"
TRADE MARK REG'D.

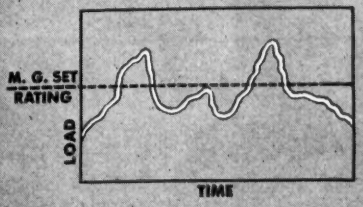
"The Copper Strip of Today"

Strips Evenly
No Possibility of Etch
No Hydrogen Embrittlement

DIRECTIONS:
Immerse work in 66% solution 160° - 180° F. Rinse. Followed by dip in cyanide. If cyanide undesirable, write for new special solvent.

Sulphur Products Co. Inc.
Greensburg 5, Pa.

ELECTROPLATING FUNDAMENTALS— how reserve capacity affects plating costs



E. P. Motor-Generators safely handle short-time overloads.

"Reserve Capacity" means that Electroplaters get more amperes per dollar from E. P. Motor-Generators. These MG Sets provide an effective ampere capacity at least one-third greater than their nameplate ratings.

The typical electroplating shop load curve to the left illustrates the importance of this feature. By taking advantage of Reserve Capacity, you can safely select a Motor-Generator with a rating of only 75% of the peak loads.

First cost of the equipment will be reduced proportionately. Operating costs will be lower. Plating efficiency will be increased.

E. P. Motor-Generators are conservatively designed to provide more value for less overall cost.

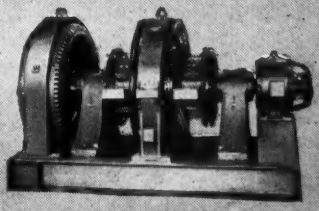
why EP motor-generators are best . . . for every application

Every electrolytic process is a special generating problem. Ordinary commercial machines cannot meet the established requirements of dependability and long life demanded by electrolytic service.

Because of the low voltages of electrolytic processes, resistance losses, for example, must be minimized. Small voltage drops, permissible in conventional generators, must be avoided. All current-carrying parts of Electric Products generators are designed for minimum voltage loss.

The Electric Products Company has, for 35 years, *specialized* in electrolytic generator design. Whatever the application, Electric Products Company will design a motor-generator especially to fit your requirements.

WRITE FOR BULLETIN 202. It describes the entire line of E. P. Motor-Generators for the Electrolytic Processes.



Every part of an E.P. Motor-Generator is readily reached for inspection and maintenance particularly important with relation to the bottom brushes. E.P. equipment requires no special protective equipment. Thirty-four years of operating experience prove that these Motor-Generators function safely under the extreme conditions common to most electrolytic operations.

EP X-23

THE ELECTRIC PRODUCTS COMPANY

1741 CLARKSTONE ROAD CLEVELAND 12, OHIO

PRACTICAL APPLICATIONS *of Modern Products*

Plating Plant Produces 1½ Acres of Plating Every 8-Hour Shift

A MODERN, fully automatic plating plant 660 feet long x 50 feet wide, entirely engineered and installed by the George L. Nankervis Co., 5442 Second Blvd., Detroit 2, Mich., was recently completed in the record time of 11 months for one of the largest manufacturers of automobiles. The plating machines were built by The Meaker Company, Chicago, Illinois, and consist of three sections; namely, copper, nickel, and chrome.

The first section for copper plating is 207 feet long and includes 15 automatic operations requiring 52 minutes to complete the cycle. The main copper plating tank contains 58,000 gallons of copper plating solution, which is circulating constantly at the rate of 1,260 gallons per minute. The circulating system passes through 16 heat exchangers, maintaining a constant predetermined temperature. By means of

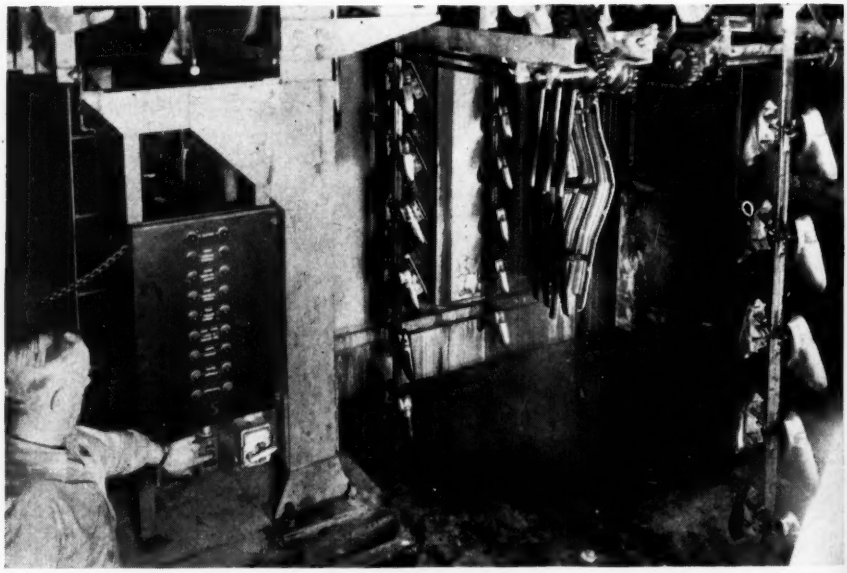


Fig. 1—This illustration shows the master panel at the starting end of the copper section. A similar control is also provided at the starting ends of the nickel and chrome sections.

A GREAT NEW COATING

by Watson-Standard

Rx-5

Co-Polymer Finish

CHEMICAL RESISTANT

ANTI-CORROSIVE

The new Rx-5 co-polymer finish will provide a fine protective coating for your product. Rx-5 is chemically resistant and is based on a thermo-plastic, non-oxidizing resin. It is non-toxic, ages without oxidizing or becoming brittle and dries by evaporation.

Rx-5 Coatings for Metal

In addition to the chemical resistance qualities, Rx-5 finishes for metal provide good adhesion, excellent flexibility, and a tough, mar-resisting film. Drying can be accomplished either by baking or air-drying and can be controlled so that it requires less than ten minutes. It can be sprayed, dipped or brushed.

A special zinc chromate type of primer has been formulated to be used in the Rx-5 metal system.

The Rx-5 finish is available in white, black and six colors.

There is a wide variety of uses for this great new finish. We invite your inquiries about specific applications. If you will include full details our engineering department can determine your exact need.

ACTUAL PROOF OF CHEMICAL RESISTANCE

The Rx-5 co-polymer finish was stringently tested for chemical resistance. Films of Rx-5 .0025 inches in thickness were immersed for six months in the following reagents:

3% Acetic Acid
10% Sulphuric Acid
10% Hydrochloric Acid
10% Nitric Acid
29% Ammonium Hydroxide
10% Sodium Hydroxide
Mineral Oil
Vegetable Oil

At the end of this six months' test Rx-5 was found to be completely *unaffected.*

THE WATSON-STANDARD CO.

Manufacturers of
PAINTS • VARNISHES • INDUSTRIAL FINISHES AND LITHOGRAPH COATINGS

FACTORY AND GENERAL OFFICES: PITTSBURGH, PA. • WAREHOUSES: BOSTON, BUFFALO, DETROIT, NEW YORK

TOUGH JOB HEADQUARTERS
℞ Prescription Finishes
Give us your coating problem. We guarantee you an answer based on your conditions and not just a standardized formula.

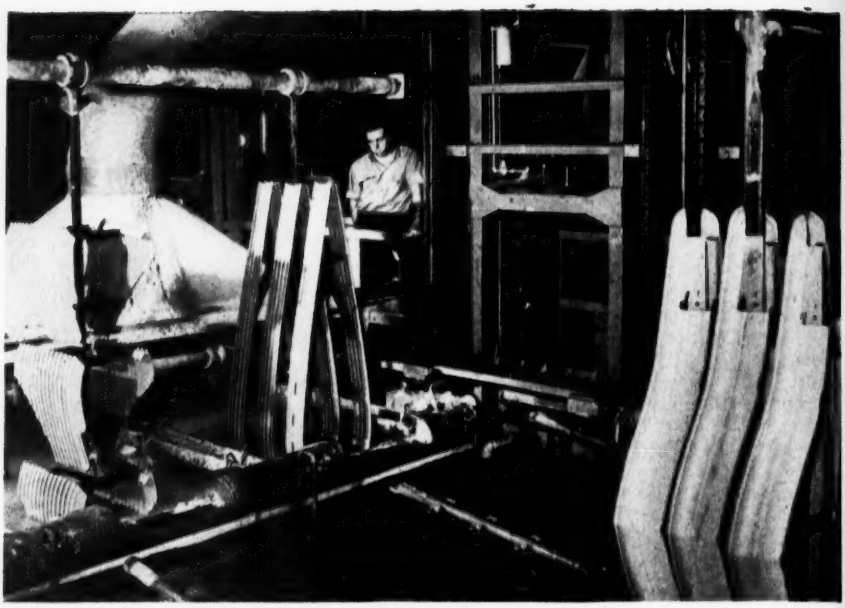


Fig. 2—This view from the catwalk that runs the full length of the completely automatic plating machines shows parts being immersed in and emerging out of the plating and cleaner tanks. The intermittently operating rinsing sprays and provision made for ventilation are also shown.

the pump equipment, the entire contents of the copper plating tank of 58,000 gallons can be transferred to an adjacent storage tank in 25 minutes.

The nickel section, which is 250 feet long, includes 14 different tanks and operations, requiring 64 minutes for a complete cycle. The nickel plating tank contains 67,200 gallons of solution which is the equivalent of 8½ tank cars. The nickel plating solution is filtered constantly and heated with 15 heat exchangers. Part of the nickel solution being circulated is passed through an electrolytic purification tank which is connected to a General Electric 2,000-ampere 6-volt rectifier.

The chrome plating section is 139 feet long and includes 10 automatic operations. The main chrome tank, having a capacity of 15,700 gallons, is divided into two compartments, allowing two lanes of work which may be operated at different cathode current densities. The chrome plating solution is circulated through both heat exchangers and coolers to maintain the predetermined temperature.

A master panel is provided at the starting end of each automatic machine, as shown in Fig. 1. If the machine is stopped for any reason, a trouble light on the master panel indicates at which point the machine has stopped, and the machine cannot be started again until the trouble light is off and a warning horn has sounded for at least 30 seconds. In addition to the master panel, a stop cord is available the entire length of each automatic machine. The plating capacity of the machines is 22,500 square feet of copper, of nickel, and of chrome—a total area of 67,500 square feet or about an acre and a half of plated surface per eight-hour day.

ALUMON

A PROCESS FOR ELECTROPLATING UPON ALUMINUM

"ALUMON" is a simple process for preparing aluminum for plating. Aluminum is cleaned, acid dipped and then immersed for about 1 minute in the "Alumon" solution at room temperature. A zinc alloy film is deposited that serves as a base for plating almost any metal including copper, nickel, silver, cadmium, zinc and tin.

"ALUMON" is a practical, production proven process in use in several hundred plants for plating jewelry, hardware, camera parts, chairs, automobile parts, engine cylinders, lamps, flashlights, buckles, buttons and plumbing goods. Barrel plating is possible for solid aluminum.

Samples of work plated and operating cycle determined free of charge.

The gleaming elegance of the chromed vacuum jug parts shown above, reflects a lustre that can be consistently obtained when the base aluminum is pretreated with ALUMON.

ENTHONE, INC.

442 Elm Street
New Haven 2, Conn.

METAL FINISHING CHEMICALS · ELECTROPLATING EQUIPMENT

procedures is supplied from 22 Chandeysson motor generator sets ranging in size from 5,000 amperes at 6 volts to 15,000 amperes at 12 volts with a total capacity of 285,000 amperes, which if converted to the proper voltage, would be sufficient electric power for 7,000 homes. Demineralizers with capacity of 3,000 gallons an hour furnish water for the plating tanks and the rinses preceding the plating. The temperatures of the heated solutions and levels on all plating tanks, cleaner tanks, and power wash machines are automatically maintained. As shown in Fig. 2, all rinse sprays operate intermittently, as the work is being raised from the tank, by means of remote control switches, relays, and timers. The total capacity of all tanks in the installation is in excess of 500,000 gallons or 55 tank cars of solution. Ventilation of all tanks requiring it is assured by 32 blowers with a total capacity of 434,000 cubic feet per minute.

Electropolishing Process for Stainless Steel

AN improved electropolishing process for stainless steel was demonstrated by The American Rolling Mill Co., Middletown, Ohio, at the recent Industrial Finishing Exposition held in Detroit in connection with the American Electroplaters' Society Convention. Essentially, the process is the reverse of electroplating. The stainless steel is the anode, and metal is removed. In electroplating, the work is the cathode, and metal is deposited.

At the Exposition, a miniature lead-lined electropolishing tank was used as a demonstrator. On cold-drawn

PAINT REALLY STICKS

WHEN METAL PARTS ARE THOROUGHLY CLEANED IN A

BLAKESLEE

METAL PARTS WASHER

Write for FREE booklet on Blakeslee Metal Parts Washers.

G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS · New York, N. Y. · Toronto, Ont.

MICCROMASK

STOP-OFF LACQUER

Only MICCROMASK STOP-OFF LACQUER HAS ALL THESE FEATURES

Easy to apply—can be brushed, dipped or sprayed with equal success.

Possesses rapid air-drying qualities, reducing drying time between coats and in preparation for racking.

Has exceptional adhesive qualities but can be removed easily after plating.

Has good dielectric strength resulting in a clean line of demarcation with no loss of current.

Assures extreme accuracy, with no possibility of a lacquer etch on precision-lapped finishes.

Absolutely neutral and will not contaminate any plating solution.

Available in red and black, identical in all physical characteristics. Red shipped unless otherwise specified.

★

Developed and Manufactured by Experienced Platers

MICCROMASK STOP-OFF LACQUER is the product of years of continued research and development in our own laboratories—tested and proven in our own plating plant under actual operating conditions. . . . Its ease of application, positive protection and overall economy are so exceptional that a thorough trial in your plant will prove a revelation. ***Write for detailed bulletin.***

MICCRO Products

MICHIGAN CHROME AND CHEMICAL COMPANY

6340 East Jefferson Avenue • Detroit 7, Michigan

stainless steel wire products, only a 2 to 8-minute dip of the work in the tank was necessary in order to obtain a good polish. Rough surfaces, as in the case of castings and forgings, require slightly longer immersion periods. The amount of metal removed is very small, usually only a half-thousandth to a thousandth of an inch.

Electropolished stainless steel products

The solutions used with the patented processes are citric-sulphuric acid, glycolic-sulphuric acid, and phosphoric acid-butyl alcohol solution. In operation, the solution temperature is maintained between 185 and 200 deg. F. Sludge precipitating in the polishing process is removed periodically. The phosphoric acid-butyl alcohol solution differs in that it is operated at about 140 - 160 deg. F. and precipitates a slime.

The current density for electropolishing is about the same as for electroplating. One-half to one ampere per square inch provides the best results in two solutions, but 1 to 1½ amperes should be used for phosphoric acid-butyl alcohol. A direct current source of 6 to 12 volts is sufficient to polish any parts.

According to Armco, an important advantage of electropolishing lies in reducing costs on certain products. In the case of small and intricately-formed products, electropolishing provides for the removal of an extremely thin layer of metal from the whole surface, thus affording the entire product a brilliant luster and solving the problem of polishing hard-to-reach crevices and recesses. When polishing small deep drawn products, cathodes of special design may be used.

Sometimes, the product may require mechanical work before electropolishing to remove grinding marks and deep scratches. Electropolishing exaggerates such imperfections; yet, even on rough surfaces, electropolishing produces a bright finish. The process is said to be excellent for polishing stainless steel wire products such as refrigerator shelves, metal racks, and kitchen tools. It provides for the removal of light weld scale and discoloration such as that resulting from resistance welding.

Appliance Manufacturer Gains Precision with Power Brushing

THE manufacturing standards established by the Hurley Machine Division of the Electric Household Utilities Corporation, Chicago, Ill., which fabricates and markets the famous "Thor" household appliances, are outstanding examples of precision workmanship. In the vast Hurley plant on the outskirts of Chicago, the

"FINISHES"... *by Stanley*

Compact cases, lipstick shells . . . why do they have so much sales appeal on the counter, so much charm on the dressing table?

One answer, of course, is colorful enamels and special lacquers that Stanley chemists have formulated for these fast selling products . . . finishes that retain their color and luster for the life of the product, that won't chip or scratch or peel.

Hundreds of metal, rubber, plastic, and textile products have benefited from Stanley's policy of "special finishes for special applications." Our research staff and unexcelled facilities are always at the service of industry . . . are *yours* for the asking.

Why not let us help you with your special finishing problems? Write to Stanley Chemical Company, East Berlin, Connecticut.

STANLEY

STANLEY CHEMICAL

INDUSTRIAL COATINGS

LACQUERS SYNTHETICS JAPANS ENAMELS

Fig. 1—Polishing aluminum die-cast parts, such as the dishwasher spinner shown in the illustration, is one of numerous power brushing operations performed by the Hurley Machine Division, Chicago, manufacturer of "Thor" household appliances.

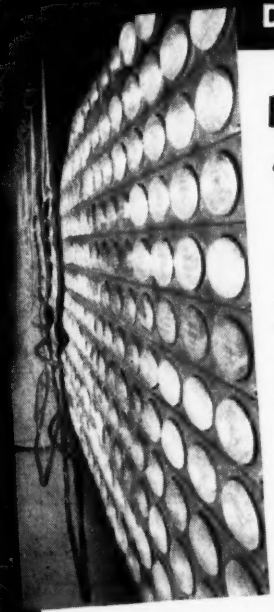
most modern machinery and efficient manufacturing methods are employed. Many of the polishing and cleaning operations are performed by means of power brushing, as are the bulk of the deburring jobs.

One such operation is the cleaning and polishing of an aluminum die-cast dishwasher spinner, as shown in Fig. 1. This job is completed on an assembly-line basis in a few seconds on a floor-mounted, motor-driven brushing wheel, using a 10-inch Osborn Monitor steel wire wheel brush equipped with 0.0095-gauge wire and operating at a speed of 1,750 revolutions per minute.

Another interesting usage of power brushing in the Hurley plant is in the removal of welding scale from a pinion gear of a washing machine part, as shown in Fig. 2. This operation is performed on an electrically-driven fixture equipped with an 8-inch Osborn Improved Monitor Section using 0.0095-gauge wire and operating at a speed of 1,750 r.p.m. Osborn brushes are also used for cleaning and polishing pinion gears, worm gears, cluster gears, basket gears, camshafts, and various other parts.

Fig. 2—This illustration shows welding scale being removed from a small washing machine pinion gear with an Osborn Monitor 8-inch diameter wire wheel brush, using 0.0095-gauge wire and operating at 1,750 revolutions per minute.

DEGREASE AND BAKE PAINT



Do BOTH with *Infra-red*

Complete Finishing System

—MORE EFFICIENT
—MORE ECONOMICAL

The completely automatic finishing operation at Barcalo Mfg. Co., Buffalo, is a typical example of production savings with a Fostoria Infrared system. Metal chair frames are degreased in 2½ minutes, sprayed with white enamel, then finish baked in 8½ minutes. Details on request.

• ONLY FOSTORIA EVENRAY EQUIPMENT HAS ALL THESE ADVANTAGES –

1. **LOWER UNIT OPERATION COST** — Greater efficiency of gold reflectors requires lower connected load — provides maximum utilization of energy.
2. **MORE UNIFORM COVERAGE** — Evenray equipment design gives extraordinarily even distribution of energy on products being processed — as little as 2% variation.
3. **MAXIMUM TEMPERATURE RANGE** — Delivers up to 125 BTU's per square inch per hour. Accommodates from 80-watt to 1000-watt lamps for fastest processing according to job requirements.
4. **MAXIMUM ENERGY UTILIZATION** — Two-wall oven construction and gold interior reflecting surface provide most effective insulation. It puts the energy on the product.
5. **COMPLETE LINE OF EQUIPMENT** — Evenray models are available for spot heating or full ovens, utilizing clear or reflector type lamps; permitting a choice for best results depending on the nature of the product to be processed. Flexibility of construction permits quick and easy alteration or addition for production changes.
6. **APPROVED ELECTRICAL CONSTRUCTION** — Listed under Re-examination Service of Underwriters' Laboratories, Inc.

Write for Brochure

EV-1146 which pictures and describes many applications with Fostoria Evenray Systems.

THE FOSTORIA PRESSED STEEL CORP.

FOSTORIA, OHIO

Specialists in Infrared Heating and Industrial Lighting Equipment

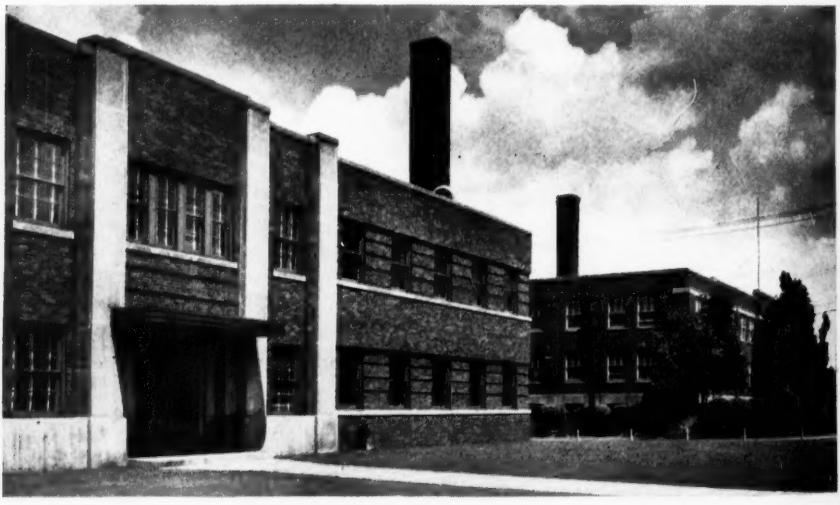
In Canada Amalgamated Electric Corp. and all Northern Electric Branches

NEWS of the Industry

Arco Opens New Laboratory

To meet modern industry's increasing demands for specialized production finishes, to spur development of new, improved protective - decorative organic coatings, and to effect improvements in existing paint, lacquer, enamel, and varnish products, The Arco Co., Cleveland, Ohio, has announced completion of a new research laboratory building. The laboratory is fully equipped with more than 37 different testing devices and allied accessory apparatus for producing a wide range of scientific analyses essential to product development, quality improvement, and production control. It is staffed by a group of experienced paint technicians, and organic chemists headed by Dr. Eugene W. Kanning.

Located adjacent to the company's general offices at 7301 Bessemer Avenue and housed in a modern two-story structure of steel frame and concrete construction, this paint research center has a functional floor area of 9,150 square feet. Consisting of four acoustically-conditioned, incandescent-illuminated laboratories, each approximately 48 x 36 feet in size, two on each floor, with offices and library in the central portion of the building, the building provides extensive facilities for the development and evaluation of organic coatings, resin research, pilot-plant production of new synthetic resins, and accelerated testing under controlled temperature conditions of finishes taken from the regular Arco production line or materials still in the development stage. Special equipment rooms adjoin the main laboratories.



Arco Company's new research laboratory building, with general offices of the company in background

THIS TELLS YOU HOW TO GIVE SAFE EXIT TO CORROSIVES

This new, 12-page bulletin tells you how, why and where you should use Duriron acid-proof drain equipment for corrosive wastes.

The booklet first tells you about Duriron; its composition, advantages, physical properties and corrosion-resisting ability. This high-silicon iron is compared with other materials and its superiority for handling corrosives is shown in dramatic visual form.

A handbook on Duriron drain line material for handling corrosive wastes, the bulletin gives engineering data, sizes, dimensions and drawings of the various pieces of Duriron equipment . . . instructions on how to install . . . information on application in chemical laboratories, industrial installations, engraving plants and other places where corrosives are handled. Installation photos and a partial list of existing installations in various types of plants are also included.

Today's high cost of repairs makes the Duriron drain line installation even more economical than ever.

Find out how you can protect your waste disposal system against costly corrosion. Write for this new, free bulletin today. Ask for Bulletin 703.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON CO., INC. • DAYTON 1, OHIO

Branch Offices in Principal Cities

DURCO Adv. 47-GM

Promoted to Technical Director

The Parker Rust Proof Co., Detroit, Mich., announces the promotion of Dr. R. C. Gibson from the position of director of research to that of technical director. Dr. Gibson is in complete charge of all laboratory, development, and pilot plant operations.

Dr. R. C. Gibson

Dr. Grant C. Bailey, formerly with the research department of the Phillips Petroleum Co., Bartlesville, Okla., has been appointed manager of the research department of Parker Rust Proof, and Gaillard W. Dell, formerly with the Bohn Aluminum and Brass Co., Detroit, Mich., has also joined the research staff of Parker Rust Proof.

IFMA Offers Cash Awards for Technical Papers

The Industrial Furnace Manufacturers Association, 420 Lexington Ave., New York 17, N. Y., announces the "IFMA Prize Contest" to promote the publication of more and better articles in the trade press describing the economic advantages obtained by the use of modern industrial furnaces, kilns, and ovens. Papers published in a trade paper in the United States between October 1, 1947 and September 1, 1948 inclusive will be eligible for prizes.

The articles may be the original or they may be technical society papers subsequently published in trade or technical papers. Competition in the contest is open to all individuals or groups with the single exception that they must not be connected with the industrial furnace, kiln, or oven industry.

The papers will be judged as follows: (a) completeness and accuracy of operating data such as fuel or electricity costs, labor costs, floor space requirements, savings in preceding or subsequent operations, material costs, and so on; (b) concise and complete coverage of improvements in the product, such as physical qualities, appearance, the reduction of rejects or rework, and so on; (c) clearness and completeness of description of equipment, including size, construction, operating cycle, and so on; (d) uniqueness of design with regard to method of operation, material handling, heating, and so on; (e) completeness of description of parts treated, size, material, rate of production, and so on; and (f) in general, the ability for a possible user in the same or similar industry to apply these data to his product or operations, and to determine the possible advantages from his use of the equipment or process.

The awards shall consist of: first prize, $1,000; second prize, $300; and third prize, $200. In addition, special non-cash awards will be made to the magazines publishing the three winning awards. Judges will be appointed by the Industrial Furnace Manufacturers Association, and will be announced before December 31, 1947. The awards will be made and checks sent to the authors of the three best articles on or before February 1, 1949. The decisions of the judges will be final.

Builds New Pumice Plant

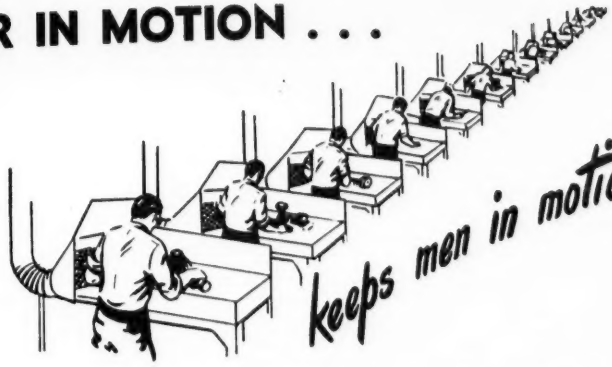
William R. Rogers, Beverly, Mass., announces that it has constructed at 80 Park Street, adjacent to its present pumice plant at 70 Park Street, a large plant which is believed to be the largest pumice producing plant in the world. One of the largest importers of pumice from Italy, the company refines all grades of genuine Italian pumice both in Italy and at its plant in Beverly for sale to the finishing and plating trade, as well as other industries.

DeVilbiss to Build New Canadian Plant

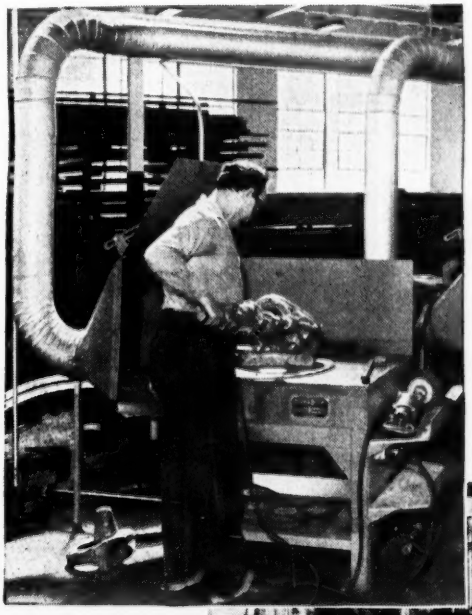
The DeVilbiss Company will soon break ground for the first unit of its new Canadian plant intended to better supply the heavy demand for spray booths throughout the Dominion. The new structure will be devoted entirely to the manufacture of spray painting exhaust systems and will enable the production of numerous new spray booth developments.

The operations in this first unit will augment the present Windsor plant production of spray guns, air compressors, and atomizers.

AIR IN MOTION . . .



keeps men in motion . . .

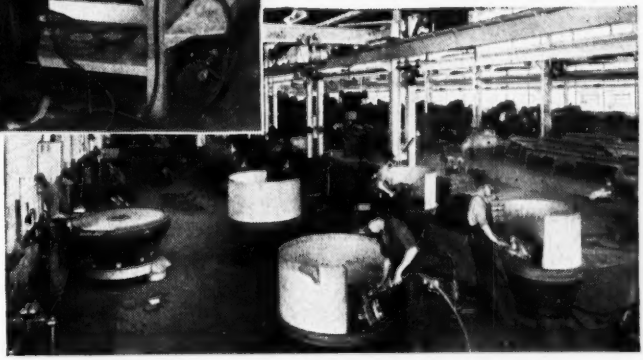


• Dusty, fume-laden air dulls the efficiency of workers, damages machines, motors and bearings, curtails production.

Illustration at the left shows a KIRK & BLUM system for castings grinding at the bench. Dust, sand and chips are removed as fast as produced. Note particularly turntable in center of bench which revolves work to operator so that he may work continuously. This results in better dust control . . . less lost motion.

THE KIRK & BLUM MFG. CO.
1816 Spring Grove Ave., Cincinnati 25, O.

KIRK AND BLUM
DUST CONTROL



Kirk & Blum Down Draft Dust Control Systems in the plants of: The Cincinnati Shaper Co. (above) and The Monarch Machine Tool Company, Sidney, Ohio (right).

New plant of Bart-Messing Corporation

New Bart-Messing Plant

The accompanying illustration shows the modern plant building at 45 Morgan Avenue, Brooklyn, recently occupied by the Bart-Messing Corporation, manufacturer of Sel-Rex selenium rectifiers. According to M. Messing, president, the most advanced scientific developments and testing paraphenalia have been installed, including a 400-ampere power line capable of testing 10,000-ampere rectifiers at full load.

The total space of the building is in excess of 6,000 square feet. The factory occupies the entire first floor, and the executive offices are located on the second floor. The laboratory for testing chemicals, metals, and plating processes remains in Belleville, New Jersey.

Harrington Retires from Du Pont Executive Committee

The retirement of Willis F. Harrington as a member of the executive committee and his resignation as a vice president of E. I. du Pont de Nemours & Company, effective August 1, has been announced following a meeting of the board of directors. At the same time, J. Warren Kinsman, general manager of the company's Fabrics and Finishes Department and a member of the board, was made a vice president and was designated a member of the executive committee. Mr. Harrington will continue to serve as a member of the board. His retirement terminates an active career with the Du Pont Company that began in 1904 as a chemist at the Eastern Laboratory.

Mr. Kinsman was first employed by Du Pont in 1915 as a general foreman in the Bayway, N. J. plant of the High Explosives Operating Department.

L. F. Moody Appointed Sales Engineer

Leslie F. Moody, 1563 Trestle Glen Rd., Oakland 10, Calif., has been appointed sales manager of The Cambridge Wire Cloth Co., Cambridge, Md., to cover the State of California.

P.E.I. Announces Industry-Wide Sales Conference

A Sales and Management Conference will be the feature program for the first day of the Porcelain Enamel Institute's Ninth Annual Meeting, to be held in Cleveland October 9th and 10th. It is planned to bring together at this conference the sales and policy-making executives of the industry, as well as the merchandising experts familiar with selling problems in the appliance, home furnishings, housewares, architectural, and other fields, for a discussion on how porcelain enamel can be properly sold.

HARSHAW ANODES and CHEMICALS

OUR job for more than fifty years has been to concentrate on improving the quality of the anodes and chemicals used by platers. You can depend on Harshaw products to keep your production moving.

NICKEL PLATING . . . nickel anodes—all commercial grades and sizes . . . anode bags . . . nickel salts—single and double . . . nickel chloride . . . nickel carbonate . . . boric acid.

CHROMIUM PLATING . . . pure "Krome Flake" 99.8% CrO_3 . . . sulphates less than .10% . . . lead, tin-lead and antimony-lead anodes.

COPPER PLATING . . . copper ball anodes . . . Rochelle Salts . . . sodium and copper cyanides . . . copper sulfate . . . copper fluoborate.

CADMIUM PLATING . . . ball and cast cadmium anodes . . . cadmium oxide . . . sodium cyanide.

TIN PLATING . . . cast tin anodes . . . sodium stannate . . . stannous sulfate . . . tin fluoborate . . . acid tin addition agent.

ZINC PLATING . . . ball and cast zinc anodes . . . sodium and zinc cyanide . . . zinc sulfate.

LEAD PLATING . . . cast lead anodes . . . lead fluoborate.

SILVER PLATING . . . silver cyanide . . . silver nitrate.

Stocks are maintained in Cleveland and in branches at Chicago, Cincinnati, Detroit, Houston, Los Angeles, Philadelphia, Pittsburgh, and New York.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

New Clinton Technical Director

Donald A. Hilliard has been named technical director of The Clinton Company, Chicago, manufacturer of lacquers, stains, paints, enamels, synthetics, and adhesives. Mr. Hilliard received a B.S. degree in chemistry from Rensselaer Polytechnic Institute in 1937 and took graduate courses in paint and pigment technology and organic chemistry at Brooklyn Polytechnic Institute in 1938. In addition, he took E S M W T courses in production control in 1941, industrial heating in 1942, and plastics technology in 1943.

Donald A. Hilliard

A member of the American Chemical Society, American Society for Metals, American Electroplaters' Society, and Society of Automotive Engineers, Mr. Hilliard, before coming with The Clinton Company, was employed by Hilo Varnish Corporation and United Chromium, Inc., and, until recently, was director of engineering and finishing at Landers, Frary & Clark, New Britain, Conn. Mr. Hilliard has written many articles on finishing materials and was formerly technical editor of "Organic Finishing" magazine.

Dr. George H. Young Promoted

Dr. George H. Young, who during the past three years has been serving as executive assistant to the director of Mellon Institute, has been promoted to an assistant directorship of the Institute. Dr. Young attended Pennsylvania State College, from which he was graduated with a B.S. in chemistry in 1932. After spending a year at the Institute of Paper Chemistry, he returned to Penn State and received an M.S. degree in 1934 and Ph.D. degree in 1936 in organic chemistry. He joined the research staff of Mellon Institute late in 1935 as incumbent of the Stoner-Mudge, Inc. Fellowship on Protective Coatings. In 1937 he was made Senior Fellow, which position he held until 1944 when he was named executive assistant to the director of Mellon Institute.

To Attend Conference Abroad

W. L. Pinner, past president of the American Electroplaters' Society and manager of research and development at the Houdaille - Hershey Corp., Detroit, Mich., will attend the Third International Conference to be held in London, September 17-20. Mr. Pinner will attend the Conference on behalf of his company.

Opens New York Branch Office

In view of its rapidly increasing business in the Metropolitan New York area and to render its customers a more adequate and prompt service, the Commercial Filters Corporation has opened a branch office at Room 1501, 92 Liberty St., New York 6, N. Y. James M. Morrison will be the New York district manager and will be assisted by Harold C. Corwin.

Appoints New Philadelphia Sales Manager

The Interchemical Corporation, Finishes Division, has appointed Charles F. Kahnhauser as sales manager of metal decorating products in the company's Philadelphia district office. A veteran of 31 years in industrial finishing, Mr. Kahnhauser began his career in 1916 as a varnish salesman for the old Ault & Wiborg Company of Cincinnati, now a part of the Interchemical Corporation.

Chas. F. Kahnhauser

After 16 years in the Middle West, Mr. Kahnhauser accepted a territory in Syracuse, N. Y. Ten years later, in 1942, he was transferred to Philadelphia where his broad experience helped solve many metal decorating problems of the war years.

NORGREN PURAIRE REGULATOR UNIT

stops moisture, grit, rust and pipe scale

Besides regulating pressure, it guards your work against water and oil spots 4 vital ways: (1) Tornado Jet Filter separates water and emulsions from the air, (2) Double Monel screen stops all solids, (3) Quiet Zone beneath baffle traps goo until blown out by operator, (4) Color tell-tale in top of purifier turns from blue to pink when moisture is present — warning operator to drain filter or check airline traps.

Norgren

C. A. NORGREN CO.

222 SANTA FE DRIVE
DENVER 9, COLORADO

Dr. A. Lloyd Taylor Joins Wyandotte Chemicals

Dr. A. Lloyd Taylor, formerly vice president in charge of research and development for H. L. Shaw and Sons, Portsmouth, N. H., and Boston, Mass., has accepted a position as research supervisor in the Wyandotte Chemicals Corporation research laboratories where his experience will be applied in the field of industrial detergents.

Dr. A. Lloyd Taylor

In addition to work on detergents in his previous position, Dr. Taylor has had many years of experience in the same field as director of research for Oakite Products and as director of the Department of Chemistry for Pease Laboratories, New York, New York.

Interchemical Accents Technical Sales Training

To fill the need for a combination sales and technical service representative who can solve 90 per cent of his customers' application problems on the spot, the Interchemical Corporation Finishes Division has adopted a technical sales training program in its Cincinnati, Ohio plant. Instituted January 1, 1946, the program is an outgrowth of valuable experience with previous projects which were well under way before Pearl Harbor but had to be abandoned during the war years. Thorough planning preceded adoption of the current program, which covers all phases of industrial finishes manufacturing, research, and product application. The course of practical and theoretical instruction is carefully spread out over a 12-month period with a maximum degree of flexibility to suit the individual trainee.

Prospective sales representatives of Interchemical are recruited from outstanding chemical and chemical engineering graduates of leading colleges and universities throughout the country. This procedure assures the company of trainees with technical aptitude. These graduates are then screened by a battery of eight standard psychological tests to select those whose personalities and abilities are best suited to the selling profession. Once selected by the company, the neophytes immediately begin their training with a 2-week period in the Maintenance Department of the Cincinnati plant. This initial assignment is then followed by 23 other periods of training varying from one to three weeks, each under the direct supervision of specialists or department heads. Supplementing the practical experience of actual participation in manufacturing, research, and service is a series of 52 weekly lectures on chemical theory, sales psychology, selling methods, distribution, and field service.

Protective Coating Division Formed

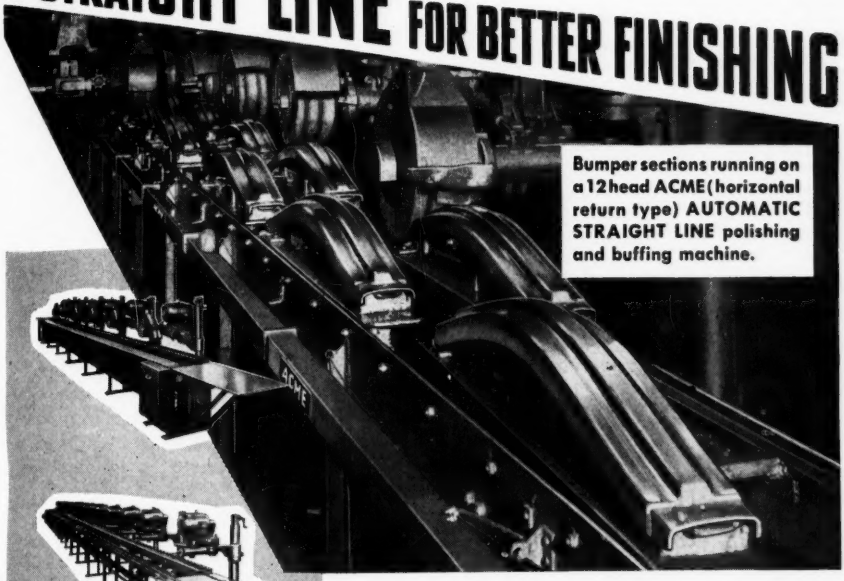
The Cyclic Chemical Co., Washington, D. C., announces the formation of the Permolite Division for the manufacture of protective coatings of the chemical-resistant type and their application to equipment of all types. Headquarters and plant operations will be in Hamilton, Ohio, where a new modern plant has been equipped for production. A modern and fully equipped laboratory is staffed with competent and experienced research and development personnel. The development and use of the various Permolite coatings are based on more than a decade of experience in the formulation and application of corrosion-resistant finishes.

Sales Representation Expanded

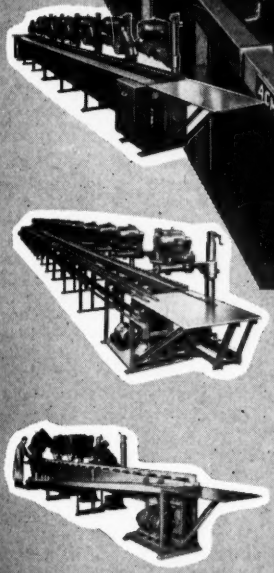
Expansion of its sales representation is announced by the American Nickeloid Co., Peru, Ill., manufacturer of preplated metals, with the establishment of a New England sales office at Beverly, Mass. In charge of this sales division is J. F. Schoellhorn, formerly of the company's Chicago office and prior to that stationed at the company's main office in Peru in a sales capacity.

Sales representatives have also been added in two other American Nickeloid offices. Norman D. Standal has joined the Seattle, Washington office, where Hughson and Merton are the representatives. William Watts and John Richards have joined the Chattanooga, Tennessee office, where C. R. Eaves and Company are the representatives.

A STRAIGHT LINE FOR BETTER FINISHING



Bumper sections running on a 12 head ACME (horizontal return type) AUTOMATIC STRAIGHT LINE polishing and buffing machine.



Horizontal return, over and under, and loose fixture with power return are straight line arrangements that can be furnished.

ACME AUTOMATIC STRAIGHT LINES have proven, in plant after plant, to be the short cut to increased production and finer finishing. Whatever the item, if it's adaptable to straight line finishing, you can depend on an ACME AUTOMATIC to speed up production in your polishing and buffing department. In addition, ACME builds all types of Semis and Rotary Automatic polishing and buffing machines.

Send samples and details for recommendations as to the most efficient automatic machine operation.

See our display—Booth 2423 — 29th National Metal Exposition and Congress, International Amphitheatre, Chicago, Ill.—Oct. 18-24, 1947

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

ACME Manufacturing Co.

1645 HOWARD ST. DETROIT 16, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 35 YEARS

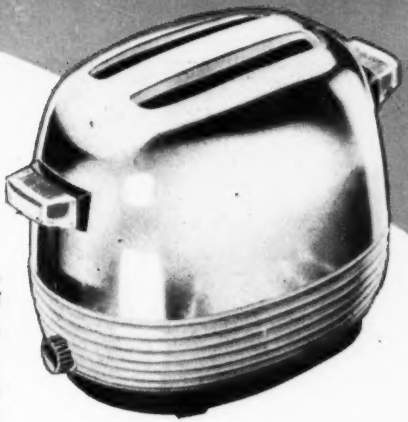
Finishes that aid in appearance and utility

(Below) The water heater shown here comprises a galvanized steel tank that is enclosed in a rust-proofed steel shell which is finished in white baked enamel and rests on a black enameled base.

(Photo courtesy Frigidaire Div., General Motors Corp., Dayton 1, Ohio)

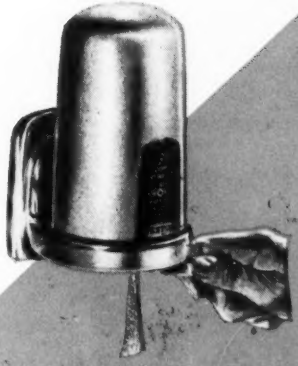
(Right) Illustrated herein are various types of aluminum seals with enamel finishes for use on a variety of consumer products.

(Photo courtesy Aluminum Company of America, Pittsburgh 19, Pa.)



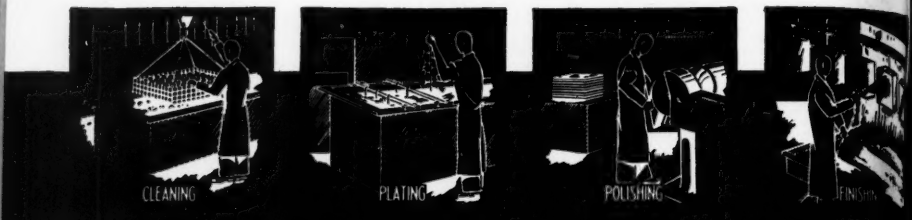
(Right) Oval in shape and beautifully designed in two-tone chromium, the shell of this automatic pop-up toaster is drawn from a single piece of high grade steel, the upper portion of which is finished in shiny, highly polished chromium while the lower part is a smooth satin finish, ridged to provide eye appeal and contrast.

(Photo courtesy Proctor Electric Co., Philadelphia, Pa.)



(Right) The soap dispenser shown herewith is made of enameled cold-rolled steel and is provided with a chrome plated base.

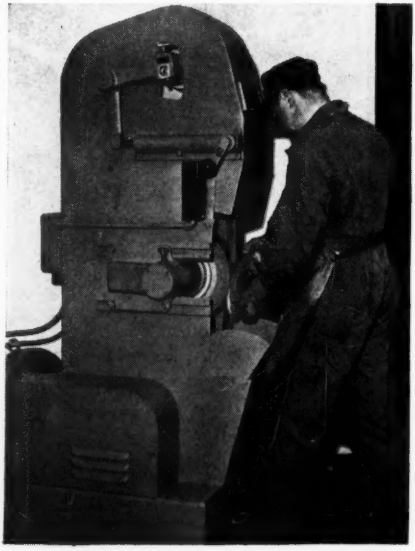
(Photo courtesy West Disinfecting Co., Long Island City 1, N. Y.)



Porter-Cable "C-6" Belt Grinder and Polisher

Especially designed for the grinding and polishing of contours, maintaining a sharp, fully-machined pattern, the Porter-Cable "C-6" Belt Grinder and Polisher illustrated herewith has been brought out by the Porter-Cable Machine Co., 302-6 Wolf St., Syracuse 8, N. Y. In the machine, a flexed abrasive belt approaches and leaves a formed contact roll at a slight angle. The abrasive belt "drapes" itself into the pattern on the roll and grinds and polishes the pattern quickly. The pattern is turned into the contact roll, which is made of sisal and latex, and is said to hold a pattern indefinitely yet is slightly resilient for smooth, fast grinding and polishing.

The Porter-Cable C-6 Grinder and Polisher occupies a floor space of 26 x 3[illegible] inches and is designed to accommodate a 148-inch abrasive belt. Its contact roll is not a driving force but an idler; thus heat and motor and shaft vibration are said to be eliminated. The surface speed of the abrasive belt is claimed to remain constant regardless of the diameter of the contact roll.

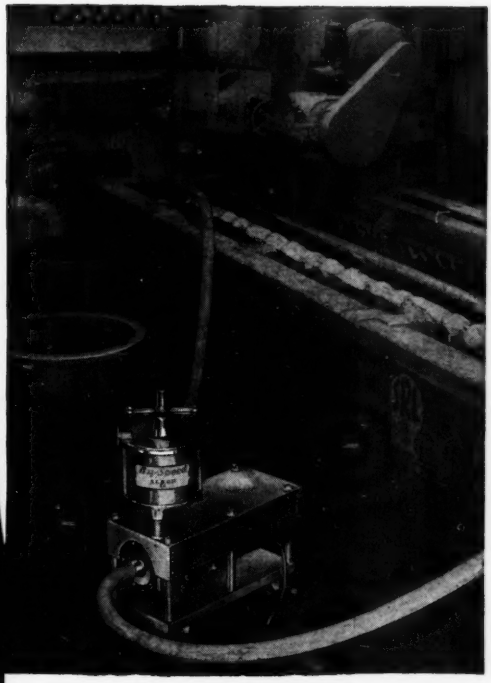


Porter-Cable "C-6" Belt Grinder and Polisher

Standard Extra Heavy Duty Proper Speed Buffing and Polishing Lathe

The development of a proper speed buffing and polishing lathe featuring extra heavy duty construction to provide the increased capacity required when using semi-automatic fixtures is announced by The Standard Electrical Tool Co., 2518 River Rd., Cincinnati 4, Ohio. The machine illustrated herewith is equipped with a 50 h.p. 1,800 r.p.m. N.E.M.A. frame ball bearing motor which is mounted on a hinged bed plate

The FILTER that Plating Shop Men Are Buying... ...ON ITS REPUTATION



Outstanding for protection against pitting, spotting, poor adhesion, formation of nodules, etc., which mean rejects and reworking, *"Sealed-Disc"* Filters have won high reputation in plating rooms large and small all over the world.

You too, can take advantage of the savings in time and labor by using an Alsop *"Sealed-Disc"* Filter in your plant.

"Sealed-Disc" Filters remove all traces of dirt, dust, oil, sludge and all other impurities from plating solutions. They are light, compact, portable and easy to move from one tank to another for instant use.

Our new catalog gives you all the facts.

The Alsop Engineering Corporation, 209 Keen Street, Milldale, Connecticut.

Send For this New Catalog

Write for your copy of P-347 which tells exactly, how, why and where *"Sealed-Disc"* Filters can help you get finer finished plated work from your plating solutions.

ALSOP ENGINEERING CORPORATION

Filters, Filter Discs, Pumps, Tanks, Mixers, Agitators

Standard Extra Heavy Duty Proper Speed Buffing and Polishing Lathe

inside the base. Power is transmitted to the work spindle through a multiple V-belt drive. A hand adjusting screw at the rear of the machine allows for placing of the correct tension on the V-belt drive.

The spindle is of nickel steel, with each end of the spindle provided with Acme threads and a hard bronze nut. A shaft lock for use in changing wheels is provided. The spindle is mounted on four ball bearings protected with labyrinth seals and equipped with liberal size oil reservoirs and sight feed oil gages. The diameter of the spindle between flanges is 2 inches. The machine is ordinarily furnished with a distance from the base to the inside of the wheel of 2½ inches, with greater clearances up to 17 or 20 inches available to individual order. The spindle speed is of the user's selection.

The Standard Extra Heavy Duty Proper Speed Buffing and Polishing Lathe can also be obtained in sizes of 20, 25, 30, and 40 h.p. Standard equipment includes a magnetic starter having overload and undervoltage protection, and a separate start-stop push-button station. An advantage of the spindle construction is that the entire spindle assembly may be removed intact without disturbing the ball bearings, thereby not interfering with the internal parts, not exposing bearings to foreign materials, and so on. Moreover, this arrangement enables the V-belt drive to be quickly renewed with a minimum of effort.

Colonial Type F Dust Collector

Said to be particularly adapted to small isolated groups of machines or single machines, a dust collector which can be located on the floor by machines, overhead, or under a bench is now being marketed by the Colonial Blower Co., 17 Francis Ave., Hartford, Conn. Designated as the Type F, the unit is made in two sizes; namely, 4F and 6F. For each size, a choice of two fan units is available, thus permitting the selection of three capacities.

According to the manufacturer, the Colonial Type F Dust Collector combines the principles of centrifugal separation and filtering to remove the dirt from the air. The cleaned air is returned to the room very close to the point at which it is picked up. The unit is available in capacities for serving one to four 3-inch diameter connections or one to two 4-inch diameter connections. With normal runs of branch piping or hose, the unit is said to produce a 2½-inch static suction at the hood collars.

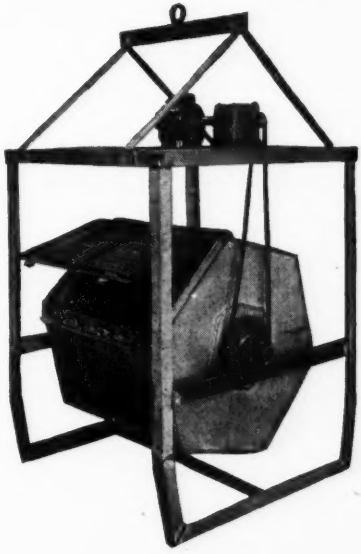
The Colonial Type F Dust Collector can be furnished with flexible hose and fittings for connections to machines if desired.

Colonial Type F Dust Collector

ROLOCK

PROCESSING CARRIERS

Stepping-up metal parts finishing steps-down the cost . . . then, if the quality's improved, you have a decided competitive advantage. That's what we try to include when you buy Custom-Built Rolock Carriers. This example is a Monel barrel for 1000 lb. loads, motorized for fast pickling prior to galvanizing. Handled by monorail hoist, it is suspended in tank by side brackets. Anti-friction Monel roller bearing is an added advantage.



Come to Rolock for baskets, trays, racks, crates, fixtures, retorts, etc. . . . all designed for your specific job and built for lower finishing costs.

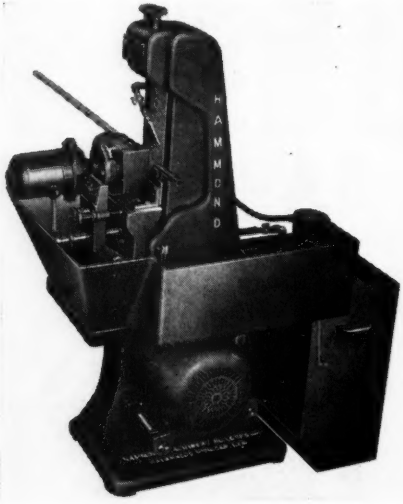
New Catalog Shows 225 Designs

ROLOCK, INC.

1400 Kings Highway East, Fairfield, Conn.

Hammond Model OD-1 Cylindrical Grinding and Polishing Machine

Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo 54, Mich., announces the addition to its line of grinding and polishing equipment of the



Hammond Model OD-1 Cylindrical Grinding and Polishing Machine

Hammond Model OD-1 Cylindrical Grinding and Polishing Machine shown herewith, which is designed for rods, bars, and tubes from ⅛ to 1¼ inches in diameter. The Model OD-1 is a centerless machine using coated abrasive belts for grinding and polishing. According to the manufacturer, the unit is designed to remove up to 0.005 inch per pass on ferrous metal parts and up to 0.010 inch on nonferrous products. Work supports are constructed to handle ½-inch bars up to 18 feet long and 1-inch bars up to 8 feet long. The accuracy on production items is claimed to be 0.001 inch, with closer limits on some work.

The endless abrasive belt employed on the machine is 4 inches wide x 60 inches long and may be operated dry or wet with coolant. Two methods of feeding are employed; namely, through-feed and in-feed. The through-feed method is generally used and is performed by swinging the regulating wheel on its horizontal axis from 0 to 12 deg. The rate of feed can be varied from 0 to 18 f. p. m.

Electronic "Spark-Guard" for Ransburg Electrostatic Spray and Detearing Equipment

The Harper J. Ransburg Co., 1248 Barth Ave., Indianapolis 7, Ind., announces an additional safety feature for its electrostatic spray coating and dip-detearing processes. The safety feature comprises an electronic "spark-guard" which is said to be so sensitive that it can be set to anticipate an accidental "short" and de-energize the electrostatic field before a spark-over develops. The device, it is claimed, will automatically stop the equipment should a piece accidentally approach the discharge electrode either from swinging, falling, and so on.

The spark-guard consists essentially of a self-contained control cabinet, power pack, and electronic relays arranged to de-energize the field when accidental dislocation reduces below safe limits the separation of electrostatic equipment transmitting electric current from the products being painted or parts of opposite polarity. The device also actuates a bell and lamp to signal the operator, and can be wired to stop the conveyor or other equipment as desired. Once the control has stopped the equipment, the fault must be removed before the field can be re-established.

The spark-guard will be supplied to all present users of both Ransburg electrostatic spray and electrostatic detearing equipment and will be incorporated in all future installations.

For a real good polishing job use

Keystone TURKISH Emery

FRESH SUPPLY AVAILABLE

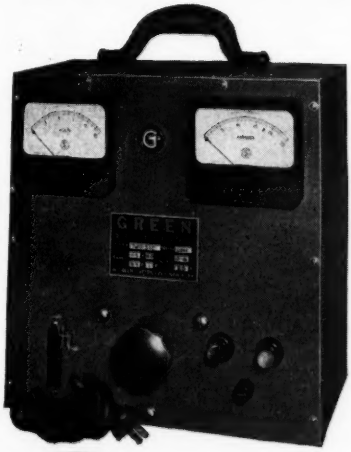
KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

WORTHWHILE READING!

2nd EDITION
of the Green "Bench Rectifier" Booklet

. . . compiled by Green Engineers. Data on over 25 different types of bench rectifier units. Sent FREE of charge or obligation by writing to us or a Green Representative.

D.C. Power Package
with a handle!



New Model 825SIC. 0-8 volts, 25 amps. 14" x 14" x 9". Also Model 725SIC 0-6 volts, 25 amps.

See Your Nearest Green Representative

FREDERIC B. STEVENS, INC.
510 Third Street
Detroit 26, Mich.

CROWN RHEOSTAT & SUPPLY COMPANY
3465 N. Kimball Ave.
Chicago 18, Illinois

MUNNING & MUNNING, INC.
202 Emmett Street
Newark 5, N. J.

A. J. LYNCH & COMPANY
2424 Enterprise Street
Los Angeles 21, Calif.

W. GREEN ELECTRIC COMPANY, INC.
SELECTRO PLATERS AND ALL TYPES OF RECTIFIER EQUIPMENT
GREEN EXCHANGE BUILDING 130 CEDAR STREET NEW YORK 6, N. Y.
RECTIFIER G ENGINEERS

"Speedtec" Synthetic Enamel

A quick air-drying synthetic enamel with a wide range of potential applications, to be known as "Speedtec," is announced by W. P. Fuller & Co., Industrial Finishes Division, 301 Mission St., San Francisco 19, Calif. The enamel is recommended for application to tractors, earth-moving equipment, toys, novelties, garden equipment, pumps, and machinery where a quick dress-up is required, as well as for various other applications.

According to the manufacturer, Speedtect dries tack-free in 20 minutes and print-free overnight and may be applied by the spray or dip method. Brushing is recommended only for touch-up work. Thinning can be done with Synal.

Alfco "Pentrate"

A product which is said to make water wetter for fire fighting is now being marketed under the name of Alfco "Pentrate" by the American-LaFrance-Foamite Corp., Elmira, N. Y. According to the manufacturer, the formula is scientifically compounded of chemical ingredients, one per cent of which when added to ordinary water provides the combined solution fast penetrating and spreading qualities superior to water itself and, therefore, more effective in fire fighting.

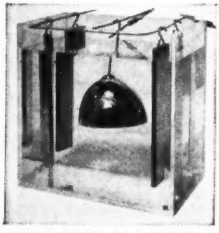
Pentrate, it is claimed, is no more injurious to metal and wood than water itself, and has even less corrosive effect than water and can be used effectively with salt water or calcium chloride solutions. Pentrate tends to make water wetter by affording the water a better chance to spread, to penetrate, and to soak into an object on fire; to cover more readily broken or rough surfaces; to penetrate deeply into bales of cotton, waste, coal piles, and so on, it is stated.

Torit Polishing and Buffing Wheel Hood

Torit Polishing and Buffing Wheel Hood

To meet the need for an efficient hood for collecting dust from polishing and buffing wheels, the Torit Manufacturing Co., 314 Walnut St., St. Paul, 2, Minn., has developed a hood of the design illustrated herewith. The hood is built in several different sizes according to wheel diameter. The arrangment and location of the exhaust outlet are such that a smooth flow of dust-laden air from polishing and buffing wheels into the piping to the dust collector is said to be assured.

Made of 16 gauge steel to provide for long service, the Torit Polishing and Buffing Wheel Hood is designed for a 39-inch spindle height and is available in the following sizes: No. 8-A (5 inches wide) for 8-inch diameter wheels; No. 10-A (6 inches wide) for 10-inch diameter wheels; No. 12-A (6 inches wide) for 12-inch diameter wheels; No. 14-A (6 inches wide) for 14-inch diameter wheels; and No. 16-A (7 inches wide) for 16-inch diameter wheels.



HIGH TEMPERATURE LUCITE PLATING TANKS for LABORATORY and PRODUCTION PLATING

Singleton tanks are made of high temperature Lucite to give unlimited life, resistance to all aqueous acids with no contamination even when changing from one bath to another, ruggedness, heat and electrical insulation, and transparency.

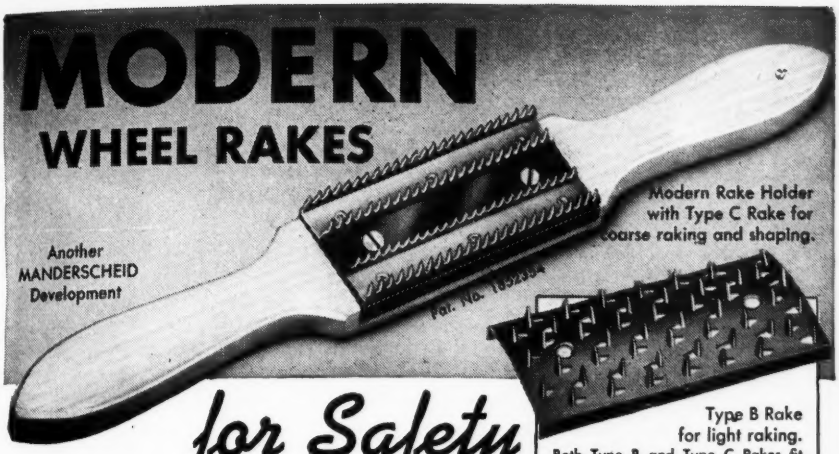
SEE THE BATH IN ACTION!

Our Singleton Production Tank, a Lucite tank within a steel tank, is the ideal, permanent answer to your plating problems at no higher cost.

Everything in Plastics for the Platers.

SINGLETON COMPANY, • 9823 Lorain Ave., Cleveland 2, Ohio, Woodbine 9056

MODERN WHEEL RAKES


Another MANDERSCHEID Development
Pat. No. 1,957,304
Modern Rake Holder with Type C Rake for coarse raking and shaping.
Type B Rake for light raking.

Both Type B and Type C Rakes fit the Modern Rake Holder, singly or one on each side. Just replace worn rakes and save the handle.

for Safety Speed and Economy

Presto POLISHING WHEEL **BUSHINGS**

Modern as **RADAR**

STOP Spindle Wear

Keep Wheels Concentric

Easily pressed into the wheel using a polishing lathe spindle as a screw press.

Another MANDERSCHEID Development

A girl can change Presto-Equipped Polishing Wheels easily, quickly and SAFELY. They slide on and off with the spindle stopped, without hazard to operator or wear to spindle.

The wheels stay concentric — do a better job faster, without wasting grit.

Use Presto Bushings in your present wheels. Specify "Equipped with Presto Bushings" when you order new wheels.

Send for free samples. Give spindle size.

Proper wheel surfaces and correct shapes are essential to efficient polishing, buffing and burring. That's why Modern Wheel Rakes *effect economies beyond estimation!*

Modern Rakes do the job right—*quickly without hazard to operator.* They recondition and shape wheels with minimum waste, *thereby conserving the wheels.*

Observe the many teeth of uniform length and spacing patterned to rake evenly to the correct depth. Note the two rakes—Type B for light raking, Type C for coarse raking and shaping—*both interchangeable on the Modern Rake Holder,* affording the *right tool* for the job in a jiffy.

Whether it's *trimming polishing wheels,—raking out buffing wheels,*—or *shaping any kind or size* of Polishing Wheel, Buffing Wheel, or Bob, Modern Rakes *do the job so much better there's no comparison.* The *extra Safety alone* makes Modern Rakes worth *many times* their modest cost.

Jobbers in principal cities.

See Us—Booth 146 Metals Show Oct. 18-24

The MANDERSCHEID Co.

810 Fulton St., Chicago 7, Illinois

Serving the Metal Finishing Trade over 35 Years.

Wyandotte Burnishing Compound 317

A burnishing compound that is designed to provide high luster to zinc, brass, nickel, silver, lead, and gold is now being marketed by the Wyandotte Chemicals Corp., Wyandotte, Mich. Designated as 317, the compound can be satisfactorily used in either hot or cold water and contains no soap or inorganic alkalis so that hardness does not affect its burnishing action. Moreover, the compound, it is claimed, does not form non-rinsable films that may interfere with the performance of subsequent operations.

Wyandotte Burnishing Compound 317 may be used for burnishing with steel balls, for burring, or for combined burnishing and burring with chips and stones in either open or closed barrels.

Richardson-Allen Automatic Electronic Voltage Regulator

Said to maintain a constant d.c. output voltage regardless of the ampere load current, the Richardson-Allen Automatic Electronic Voltage Regulator illustrated herewith has been placed on the market by the Richardson-Allen Corp., 15 W 20th St., New York 11, N. Y. The voltage regulator is claimed to have maximum regulation sensitivity. At any preset voltage, a voltage change of plus or minus 1/10 to ¼ volt is said to cause instantaneous control reaction.

Richardson-Allen Automatic Electronic Voltage Regulator

Features of the Richardson-Allen Automatic Electronic Voltage Regulator include a voltage selector preset switch, pilot light that shows changing loads, low power consumption, and compact construction that allows for easy handling of the unit. The regulator measures 8 inches high x 14 inches wide x 12 inches deep and is designed for 115-volt, single phase, 50/60-cycle a.c. input; the standard model is for 1 to 9-volt d.c. output. Models can be designed to meet particular specifications for any line voltage and frequency.

Louric Electro Plater

A portable plating unit for laboratory and special use, to be known as the Louric Electro Plater, is now being marketed by the Louric Manufacturing Co., 1809 Callowhill St., Philadelphia 30, Pa. The unit is designed for operation on 11

Your Saving

ON ONE LOT OF FINE ELECTRICAL PARTS MIGHT PAY FOR A BIG SUPPLY OF

PRECISION

DUST CAPS AND THREAD PROTECTORS

REAL PROTECTION for small fittings, exposed openings, coil forms, etc., storage or transit. Any shape. Keeps out moisture, oil, rust, dust, and grit. Acid-free, spirally wound for strength. Send for samples and descriptive folder.

PRECISION PAPER TUBE CO.

2053 W. Charleston St., Chicago 47, Ill.

BUT . . .

In retrospect, it appears hazardous and plodding. Today, business and industry demand speed, efficiency, and positive results. In the field of light metals

ALODIZING WITH

Alodine*

is the modern answer to the old problem of protecting aluminum and conditioning it for paint.

ALODIZING** is completed in 2 minutes or less. It requires no expensive electrolytic equipment—no especial skills. Coating and sealing are achieved simultaneously — in a chemical bath. Except for the "ALODINE" tank, which must be of stainless steel, only mild steel equipment is needed. Aluminum fabricators—for maximum protection of painted or unpainted surfaces—for speed—simplicity — economy—reduced handling — ALODIZE**.

*Trade Mark of the American Chemical Paint Co.—Reg. U. S. Pat. Off.—denoting a phosphate-chromate containing compound for coating metal articles.

**Trade Mark of the American Chemical Paint Co.—denoting the process of coating metallic articles with phosphate-chromium compound in a bath made with "ALODINE."

CHEMICALS
ACP
PROCESSES

RUST PROOFING AND PAINT BONDING

Granodine *
Duridine *
Alodine *
Lithoform *
Thermoil-Granodine *

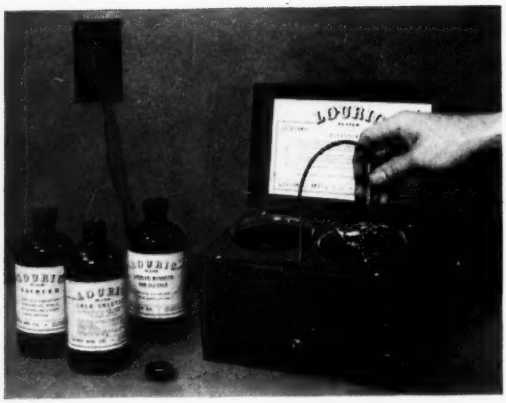
RUST REMOVING AND PREVENTING

Deoxidine *
Peraline *

PICKLING ACID INHIBITORS

Rodine * ®

AMERICAN CHEMICAL PAINT CO.
ACP
AMBLER PENNA.



Louric Electro Plater in use

volts, 60-cycle a.c., but can be obtained for operation on d.c. if desired.

Enclosed in a steel kit, the Louric Electro Plater features concealed anodes, tell-tale light indicator, snap switch for operation, cold processed solutions (all color solutions available), easily replaceable beakers, and lid to protect solutions from dust. The unit is supplied complete with 1 pint of gold solution, 1 pint of silver solution, 1 pint of lacquer, 1 pint of lacquer remover, 2 anodes, 1 wire clamp, and 1 package of plating wire.

McDougall - Butler "Ferrolastic" Rubber Base Paint

Said to be ideal for concrete floors, concrete walls (inside or outside), masonry surfaces, and metal surfaces (requiring chemical resistance), a rubber base paint to be known as "Ferrolastic" is now being marketed by the McDougal-Butler Co., Inc., Buffalo 5, N. Y. Designed to resist acids, alkalis, weather, and water, the paint can be easily applied by the brush or spray method and is said to dry quickly.

McDougall - Butler Ferrolastic Rubber Base Paint is available in several types, including a floor enamel, masonry paint, and chemical resistant coating. The floor enamel is a high gloss enamel that is said to stay glossy, and is designed to resist penetration of water, acid, or soap alkali. It is said to be ideal for all concrete floors as the enamel seals the concrete, thus preventing cracking, moisture damage, and deterioration, and is available in a choice of six colors and white.

The masonry paint is designed to produce a non-fading weatherproof coating on stucco, masonry, cinder blocks, concrete blocks, and asbestos shingles. Also said to rebond deteriorating masonry, the paint is offered in a choice of six colors and white.

The chemical resistant coating is intended for the protection of tanks, pipes, walls, or any other surfaces exposed to chemicals, and is available in eight attractive colors that are said to stay firm once applied.

Colonial Type S Dust Collector

Recommended for machines which are used intermittently, a dust collector which is substantially constructed with angle iron framing and heavy gauge steel and is completely self-contained in

FOR **A Perfect Finish** ON
Automobiles, Metal Products, Etc. . . . Use the
Ideal Tack Rag
Recommended by all leading paint manufacturers
Available in 4 sizes—12x18—18x18—18x36—36x36—Immediate Delivery
IDEAL CHEMICAL CO., 1499 Dean Road, Cleveland 21, Ohio

NOW

DU-LITE
TUMBLING COMPOUNDS

DU-LITE No. 222 is an abrasive-free tumble cleaning agent, designed speedily to remove messy oil films and soil impregnations from metal parts through its powerful, yet harmless detergent action. No. 222 can be used in tumbling barrels with or without steel shot, discs or stone chip fillers.

DU-LITE No. 333, containing selected abrasives, does a quality tumble-deburring operation on metal parts, and produces a velvety smooth finish. No. 333 can be used with or without steel shot, discs, or stone chip fillers. These new products are up to DU-LITE'S famed high standard.

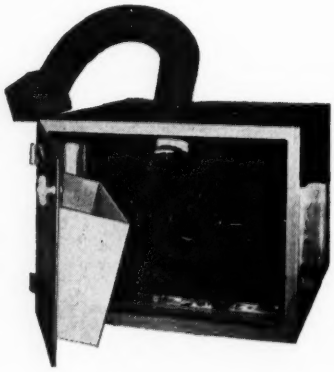
Send for generous experimental samples of these tumbling compounds and the literature describing their unique features.

DU-LITE CHEMICAL CORP.

100 River Road

MIDDLETOWN, CONNECTICUT

a box 20 x 22 x 16 inches is announced by the Colonial Blower Co., 17 Francis Ave., Hartford, Conn. The front of the box is a hinged door which permits easy access



Colonial Type S Dust Collector

for removing dirt, changing filters, or for inspection. The back of the box is a heavy plate on which is mounted the power unit. This plate can be removed and placed on a bench or table for working convenience if changes or repairs are necessary.

Designated as the Type S, the dust collector, according to the manufacturer, has a capacity of 325 c.f.m. at 3¼-inch w.g. and will produce a static suction of 2-inch w.g. in a suction nozzle with 4 feet of 3-inch diameter flexible metal hose. Powered with a ⅓ h.p. motor, the unit can be used to serve surface grinders, tool grinders, and other isolated machines which cannot readily be connected to an exhaust system.

HARRISON
4A
COMPOUNDS
for
BUFFING and POLISHING

FASTER CUTTING — ECONOMY
INCREASED PRODUCTION
ON

- CUTTING
- CUT AND COLOR
- MIRROR FINISHING

Send Us Your Problems
We'll Send Samples

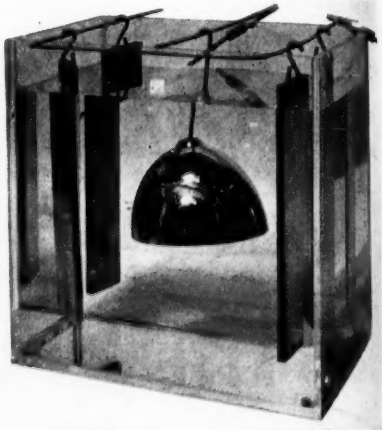
Quality and Uniformity Always

HARRISON & CO., INC.
Haverhill Mass.

Singleton High Temperature Lucite Plating Tank

A transparent plating tank for laboratory and production plating is now being marketed by the Singleton Co., 9823 Lorain Ave., Cleveland 2, Ohio. The tank is made of high temperature Lucite which is said to provide for unlimited life; resistance to all aqueous acids with no contamination even when changing from one bath to another; ruggedness; heat and electrical insulation; and transparency, thus enabling the action of the bath to be observed.

For production plating operations, a Lucite tank located within a steel tank is available.



Singleton High Temperature Lucite Plating Tank

RESEARCH-FITTED TO SUIT YOUR NEEDS EXACTLY

CARPET

FELT

MOHAIR

SUEDE

VELOUR

"SPANGLES"

Rayco Flock Synthetic Finishes

IN ANY COLOR—ON ANY MATERIAL

INVESTIGATE FLOCK---

Request our new Color Card.

Rayon Processing Co. of R. I., Inc.

PIONEER PRODUCERS OF SURFACE COATING FLOCKS

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COLONIAL PROCESS SUPPLY CO.
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GRAPHIC ARTS CENTER
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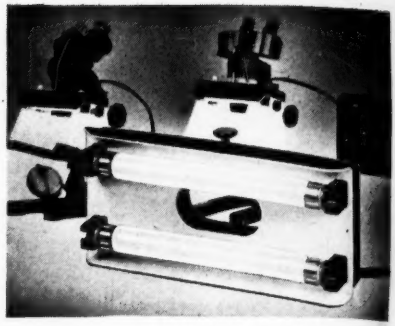
ATLAS SPEC. MFG. CO.
3255-59 S. Shield Ave.
Chicago 16, Ill.

W. H. HALL
182 Jarvis St.
Toronto, Ontario

Stocker and Yale Miniature Fluorescent Microscope Lamp

Designed to meet the need for a cool light source of high intensity and uniform field for direct attachment to most types of microscopes for use in the final inspection of finished parts and the basic analysis of pigments for paints, as well as other applications, the Stocker & Yale Miniature Fluorescent Microscope Lamp illustrated herewith has been placed on the market by Stocker & Yale, 48 Birch St., Marblehead, Mass. The twin 4-watt fluorescent lamps straddle the microscope objective lenses and direct a flood of light to all surfaces of the object under study. Halos and highlights are said to be eliminated by the length and separation of the bulbs and by the nature of fluorescent light itself.

The Stocker & Yale Miniature Fluorescent Microscope Lamp is designed to produce a light intensity of 450 foot-candles at a 3-inch working distance and a color temperature of 3,500 deg. Kelvin. The operating temperature of the lamp (115 deg. F.) permits comfortable operation due to the absence of radiant heat and hot surfaces. Operation is limited to 115 volts, 60-cycle a.c. Starting is accomplished by connecting the plug-in type ballast reactor at the end of the 6-foot lamp cord into a standard electrical outlet and then twisting the starter knob on the lamp. Both bulbs are said to light immediately without flicker and are rated at 2,500 hours normal life.



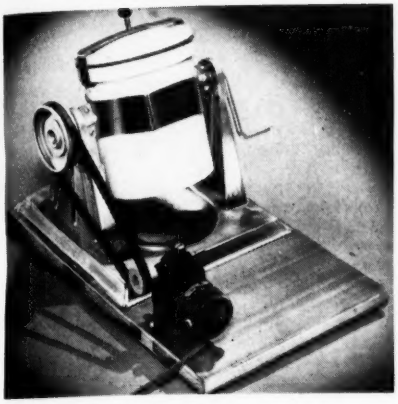
Stocker & Yale Miniature Fluorescent Microscope Lamp

The Stocker & Yale Miniature Fluorescent Microscope Lamp is 1⅝ inches high x 2¾ inches wide x 6¼ inches long. Several styles of attaching brackets are available for various models of microscopes, and the lamp is finished to harmonize with the microscope.

Andrew Motor-Driven Tumble-Jar

A recent addition to the Tumble-Jar line manufactured by Andrew Technical Service, 111 E. Delaware Place, Chicago, Ill., is the motor-driven model shown herewith. Powered by a gear reduction motor, it rotates a glazed chemical stoneware jar, 6 inches in diameter by 8 inches high, at a speed of approximately 55 r.p.m. Owing to the heavy weight of the glazed jar, it can also be used as a ball mill. The jar has a reinforced rim and stoneware cover which fits tightly against the soft rubber gasket by means of a metal clamp, making it leakproof in use. Overall dimensions are 14 x 22 x 15 inches high. The motor can be operated on 115 volts, 60-cycle alternating or direct current.

In chemical process work, the unit is applicable to research operations and pi-



Andrew Motor-Driven Tumble-Jar

lot tests on chemicals, coloring agents, pigments, and paints. It can be used for blending, mixing, dispersions, emulsions, and colloids. Liquids and solids can be handled.

Industrial applications include small scale tumbling, deburring, and plating operations on metal parts, ceramics, rubber, and plastic materials.

Unichrome Clear Dip

Unichrome Clear Dip, a single chemical treatment for new zinc plate, has been developed by United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y. The dip is said to produce a brilliant conversion coating on ordinary zinc plate; tests have shown treated zinc to withstand more than 50 hours of standard salt spray exposure without dulling or the formation of white corrosion, it is claimed.

The process is described as fast, with good results obtained at room temperature. Actual dipping time is from 5 to 20 seconds, with several water rinses preceding and following the dipping. Acid-proof or suitably coated tanks and dipping baskets are used.

Unichrome Clear Dip is said to make zinc a practical product finish. Treated surfaces are claimed to have an unusually bright finish and maximum resistance to discoloration, to be non-fingermarking, and to possess excellent "shelf-life." The treatment is also said to form an excellent primed surface for any clear lacquer or pigmented organic coating.

Duraplex ND-78 Alkyd Resin

Known as Duraplex ND-78, a non-oxydizing phthalic alkyd resin with high alkali resistance, excellent color retention, and compatibility with urea or melamine formaldehyde resins and nitrocellulose is announced by the Resinous Products & Chemical Co., Washington Square, Philadelphia 5, Pa. Used in combination with such urea formaldehyde resins as Uformite F-200E or MM-55, Duraplex ND-78 forms vehicles particularly suitable for white baking enamels for washing machines, hospital equipment, stoves, kitchen cabinets, and other applications.

When used with nitrocellulose, Duraplex ND-78 is said to produce high quality lacquers for furniture, automotive use, and metals requiring general purpose pigments or clear coatings.

Edmont No. 908 Rubber-Coated Glove

Designated as the No. 908, a rubber-coated glove especially adapted for the

workman preferring lightweight and flexibility and at the same time full waterproof protection and long wear is announced by the Edmont Manufacturing Co., Coshocton, Ohio. The glove is made of a special high tensile fabric having an

Edmont No. 908 Rubber-Coated Glove

improved rubber coating which is said to afford maximum hand freedom, comfort, and a firm grip.

According to the manufacturer, the Edmont No. 908 Rubber-Coated Glove is water and liquid-proof, oil and grease-resistant, and is recommended for heavy duty jobs, as well as for lighter work.

"Quakesters"

The Quaker Chemical Products Corp., Conshohocken, Pa., announces the manufacture of polyethylene glycol esters under the trade name of "Quakesters." These materials are intended for use in the manufacture of textile finishing materials, paints, emulsion products, plastic articles, adhesives, and other items.

The Quakesters are surface active agents of the non-ionic type. Certain specific members are said to be excellent detergents, while others are high in emulsifying power. Still other usages are dependent upon the esters as plasticizers and dispersing agents. Depending upon molecular structure, water or oil solubility or dispersibility of individual esters varies over a wide range. Unusual flexibility of chemical and physical properties is obtainable, thus enabling the esters to be used for meeting a diversity of requirements.

Prufcoat Aluminum

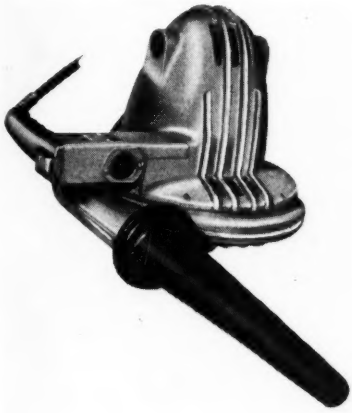
Prufcoat Aluminum, an economical all-purpose ready-mixed aluminum paint that is said to stay bright over a long period, is now being made available for general maintenance painting by Prufcoat Laboratories, Inc., 63 Main St., Cambridge 42, Mass. The paint is made with a special aluminum powder that is said to leaf unusually well. According to the manufacturer, each particle of aluminum powder is encased in a special acid, alkali, and water-proof synthetic vehicle, thus protecting the leafed aluminum from any dulling or corrosive effect.

The leafed alumiuum particles plus the polymerized Prufcoat vehicle, in addition to providing positive protection against acids, alkalis, and water, are claimed to seal-in all average surface conditions. The volatile solvents in Prufcoat Aluminum are said to evaporate within a few minutes after application to leave the coating dry to the touch, thus making it particularly useful for outside storage tanks, fences, roofs, sheds, and so on, as well as for production line painting where it is desired to paint sheet metal products and either keep the production line moving or handle the painted product within a matter of minutes.

FOR WOOD AND METAL FINISHES
Use Bright, Rich
HARDCOTE
One Hour Dry
• One coat covers to give your products a beautiful, full gloss finish that can really take it. Hardcote resists acids, alkalis, and weather. Easy to apply by brush, spray or dipping. Tack dries in 15 minutes, dries hard in one hour. Write for color card and information. Made only by
McDOUGALL-BUTLER CO., Inc.
6 Evans Street
Buffalo, New York

Ideal Redesigned Portable Electric Cleaner

Ideal Industries, Inc., 1031 Park Ave., Sycamore, Ill., announces a completely redesigned portable electric cleaner which, it is claimed, can be operated con-



Ideal Redesigned Portable Electric Cleaner

tinuously 24 hours a day if necessary. The unit is available in two models; namely, a heavy duty model weighing 14½ lb. which is powered with a 1⅓ h.p. motor and is designed to blow air at a velocity of 25,000 feet per minute, and a medium duty model weighing 9½ lb. which is powered with a 2/3 h.p. motor and is designed to displace air at 19,000 feet per minute. Both models have precision type sealed ball bearings and air stream cooling scrolls which are said to permit continuous operation without overheating.

According to the manufacturer, the Ideal Portable Electric Cleaner can be used as a vacuum for removing dirt, dust, and grime from machinery, motors, generators, electrical apparatus, floors, benches, overhead pipes, and so on, or may be used as a sprayer for paint, varnish, lacquer, and so on. If a drying action is desired, a heater nozzle may be attached to the unit for raising the air flow temperature to a minimum of 85 deg., thus making it useful in drying motor windings and electrical equipment to prevent shorts and corrosion, as well as in drying paint, ink, and so on.

Durco Hills - McCanna Saunders Patent Diaphragm Type Valve

A diaphragm type valve known as the Hills-McCanna Saunders Patent Valve is now available from the Duriron Co., Inc., Dayton 1, Ohio, in the corrosion-resisting alloys, Duriron and Durichlor. The Duriron valve is said to be particularly resistant to sulfuric, nitric, and acetic acids, being practically unaffected in any concentration and at any temperature. Durichlor is recommended for all concentrations of hydrochloric acid at temperatures below the boiling point.

The basic three-unit construction—bonnet assembly, diaphragm, and body—is the same in the Durco Valve as in all other Hills - McCanna Saunders Patent valves. The moving parts of the bonnet assembly are loose - fitting and free-acting. A tough, resilient reinforced molded diaphragm, available in many types of rubber and synthetic rubber materials, separates the body and the operating mechanism. A stud is molded into it for attachment to the compressor. This stud attachment permits accurate control of the diaphragm for throttling and for operating under pressure or vacuum.

The valve body is comparable to two

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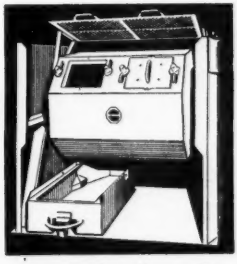
PARTS MECHANICALLY

CUT LABOR COSTS

Produce semi-lustrous finish on stampings, machined parts, die castings, forgings, extrusions for automotive, building, plumbing, appliance, general hardware, fishing tackle, tools, business machines.

Saves Time!



ROTO FINISH

The Sturgis Products Co.

434 Jacob Street

STURGIS, MICHIGAN

Durco Hills-McCanna Saunders Patent Diaphragm Type Valve

long sweep elbows joined together. Freedom from pockets, grooves, and recesses is said to reduce pressure drop to a minimum. Even the most severe slurry service is said to have little or no effect on any part of the valve body when made of Duriron or Durichlor, since these alloys are claimed to be extremely hard and abrasion-resisting.

"Redskin" Protective Coating

Recently developed by the Dennis Chemical Co., 2700 Papin St., St. Louis, Mo., is a protective liquid-plastic coating for polished or bright metal known as "Redskin". The coating can be readily applied by the spray, brush or dip method and dries quickly, forming a tough, elastic film that is said to be impervious to rust, chemical reaction, smears, or normal handling. The red color instantly warns against promiscuous rough handling of bright or polished surfaces.

GOLD PLATING SOLUTIONS

In All Colors

Guaranteed 100% Pure Gold Content

Troy Weight - Color Constant

Tarnish Resistant

Proven Quality by the Acid Test

Write or call our experts about your plating problems

Davis-K-Products Co.

54 West 22nd St., New York 10, N. Y.

Oregon 4-4108

4-4109

"Steel-Grip" Safeguard No. 15958

Designed to provide "over-end" finger protection, the "Steel-Grip" Safeguard No. 15958 illustrated herewith has been developed by the Industrial Gloves Co., Danville, Ill. In addition to protecting fingers and thumb on the face and sides, the design of the guard also affords leather protection to the end of the finger.

The finger tip includes no seam or joint, thus assuring positive, comfortable handling of even the smallest parts for buffing, polishing, grinding, and so on. The seams on the sides of the guard are well

"Steel-Grip" Safeguard No. 15958

up on top of the finger and out of the wearing zone. The elastic webbing on the back of the guard is said to assure a comfortably tight, cool, non-slip fit at all times.

The Steel-Grip Safeguard No. 15958 is made in three weights of leather (light, medium, and heavy) in four sizes; namely, small, medium, and large for fingers and a size for the thumb.

New Literature

Concise Chemical and Technical Dictionary. Edited by H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court St., Dept. 18, Brooklyn 2, N. Y. 1,055 pages, 6 x 9 inches. Cloth binding, board covers. Price, $10.00.

This volume contains information regarding newly developed synthetic chemicals, processes, and apparatus; thousands of chemical, physics, metallurgical, mathematical, and other terms; the most important manufacturing processes and machinery; raw materials and finished products; terms used in mechanical, electrical, radio, and television engineering, welding, and other shop practices; common and rare chemicals; and so on. Included are terms gathered by the Allied Combined Intelligence Objectives in Germany and other occupied countries.

A special feature of the dictionary is a listing of thousands of trade name or proprietary products in the synthetic resin, plastic, metal, paint and varnish, and other fields, including emulsifying and wetting agents, plasticizers, detergents, accelerators, and anti-oxidants. Conversion tables are provided for weights, temperature, specific gravity, and so on, together with tables on indicators, organic ring systems, chemical elements and their discoverers. Also included are up-to-date addenda sheets which list the newest trade names and definitions of additional technical terms.

"Index to A. S. T. M. Standards" as of December 1946 has been published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. The publication is really an adjunct to the A. S. T. M. 1946 Book of Standards and enables any of the some 1,400 standard specifications and tests in the volumes to be readily located. The index is also a service to those desiring to determine whether the A. S. T. M. has issued standard specifications, test methods, or definitions covering a particular engineering material or subject.

All items are listed in the index under appropriate key words according to the particular subject they cover. As a convenience, a list is given of the specifications and tests in numerical sequence of their serial designations. Copies of the 242-page publication are furnished without charge on written requests to A. S .T. M. headquarters.

Plating Rack Manuel. By William E. Belke. Published by Belke Manufacturing Co., 947 N. Cicero Ave., Chicago 51, Ill. 100 pages, 8½ x 11 inches. Illustrated. Board covers. Price, $5.00.

How to cut costs by improved racking, how to design efficient racks, how to make racks that stand up, how to make anodizing racks, how to select the most efficient rack insulation, and how to rack small parts are a few of the many topics covered in this unusually complete plating rack manual prepared by a man with over 25 years of pioneering in the development of more efficient plating racks. One hundred and forty four illustrations show actual production-proved racking methods, and 30 full-page plates present Belke standard design racks, removable tips, and cathode hooks.

Some of the subjects covered in the manual are: Positioning Difficult Articles for Plating; Spacing to Avoid Shading; Use of Auxiliary Anodes and Burning Bars; Determining the Most Efficient Rack Style; Determining the Size of Frame Members, and so on.

"Step Up Production," a 16-page illustrated booklet intended for those engag-

• **Better Finishing**
• **Lower Cost**

Especially designed for high speed cylindrical work, "PRODUCTION" MODEL 101 centerless feed polishing machine produces better finishing at lower cost. It feeds automatically without centering, chucking or holding. All parts are guarded and readily accessible for changing the wheel. The construction is rigid and durable throughout. Any desired finish on rods, tubes or bars, ¼" to 6" in diameter.

PRODUCTION MACHINE CO.
Greenfield **Mass.**

ed in finishing metal parts by grinding and polishing, is announced by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn. The booklet features the "3M Backstand Method" and contains among other data nine photographic case histories of plants which were able to cut grinding and finishing time from 30 to 80 per cent by adopting this method. Also included are information and pictures regarding the various pieces of equipment which may be adapted to the method and a description of the 3M Methods Engineering Service which is available to those requiring help on grinding problems. Copy free.

"Adhesive Facts" is the title of a four-page bulletin released by the B. B. Chemical Co., 784 Memorial Dr., Cambridge, Mass., which lists typical materials bonded by Bostik adhesives, examples of products now being made with Bostik, and types of adhesives in the Bostik line. Copy free upon request.

Corrosion Resistant Materials and Equipment. As an aid in helping those interested in corrosion resistant materials and equipment to determine quickly the wide range of products manufactured by the company, The U. S. Stoneware Co., Akron 9, Ohio, has prepared a 16-page bulletin which presents illustrated and descriptive information on acid brick, acid pumps, Acikote, chemical porcelain, chemical stoneware, conical blenders, corrosion-resistant cements, drum rollers and tumblers, Duralon, gasketing, jar mills, laboratory equipment, lead, pipe and fittings, pots and jars, protective coatings, raschig rings, Resilon, suction filters, rubber, tank linings, tower packing, tubing, Tygoflex, Tygon, and valves. Copy of Bulletin K is available free by writing to Mr. R. W. Grace at the above company.

Durco Heat Exchangers. A four-page illustrated bulletin on heat exchangers for heating and cooling corrosive solutions has been released by The Duriron Co., Inc., Dayton 1, Ohio. The bulletin includes (1) data on the corrosion resistance of Duriron, the high silicon iron of which the heat exchangers are made; (2) data on the uses and advantages of the heat exchangers; (3) sketch of a typical chrome plating arrangement; (4) sketch of a typical anodizing installation; (5) drawing showing a complete corrosion-resisting heating or cooling unit, consisting of Durco heat exchangers, pumps, pipe and fittings, all mounted on a steel frame, assembled and supplied as a unit; and (6) installation photographs. Copy of Bulletin No. 1603 free upon request.

American Bonded Steel Base Metals. An illustrated folder containing descriptive information on, as well as actual samples of, American Bonded Nickel Steel, Chrome Steel, and Copper Steel, available in coils ⅛ to 24 inches wide for use in the production of a wide variety of items, has been prepared by the American Nickeloid Co., Peru, Ill. Copy free upon request.

Oakite-Vapor Steam Cleaning Unit. A 12-page illustrated booklet descriptive of its improved Oakite-Vapor Steam Cleaning Unit, a steam generator for all-purpose industrial steam-detergent cleaning, has been issued by Oakite Products, Inc., 20 Thames St., New York 6, N. Y. Data on unit construction, engineering specifications, types of models available, and job applications of the steam generator for multiple-duty industrial steam-cleaning and paint-stripping operations are factually presented in concise form in the booklet. For greater clarity, the text has been augmented by a series of clear-cut illustrations of operating, control, and mechanical features; types of models available to meet varying job requirements, and interesting views of the unit in actual steam-cleaning operations of various kinds. Copy free upon request.

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"Vienna Brand" Lime

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

WRITE FOR FULL PARTICULARS

ALLWOOD LIME COMPANY

Manitowoc • Wisconsin

National Paint Dictionary. 3rd edition. By Jeffrey R. Stewart. Published by Stewart Research Laboratory, P. O. Box 173, Benjamin Franklin Station, Washington, D. C. 704 pages, 6 x 9 inches. Price, $7.50.

In this third edition of Mr. Stewart's National Paint Dictionary, the scope has been considerably expanded to the extent that the author has called upon two noted technologists for assistance; namely, Eugene F. Hickson, Chief of the Paint, Varnish and Lacquer Section of the National Bureau of Standards, and Dr. Raymond B. Seymour, Director of the Industrial Research Institute, University of Chattanooga, Tenn. The size of the book has been reduced to 6 x 9 inches to meet the popular demand and to facilitate its use on the standard library shelf. The number of pages has been increased from 216 to 704, and a type face has been used which provides maximum legibility.

Instead of deriving a definition as a result of references to other handbooks, reference volumes, dictionaries, encyclopedias, and so on, as done in preparing previous editions, the author has obtained a cross-section of the opinion of leading scientific and technical men in the industry since it is believed that the manufacturer or industrial consumer of any particular product is best qualified to suggest such a definition. The terms included in the dictionary may be divided into six categories as follows: (1) industrial raw materials used in the production of paints and allied products; (2) trade names of raw materials and certain finished products; (3) terms describing processes, methods, systems, and so on; (4) terms denoting scientific instruments used primarily for evaluation purposes; (5) terms denoting colors, optical effects, textiles, and so on; and (6) miscellaneous terms which provide general information to the reader, jargon expressions peculiar to the industry, and so on.

Jensen Infra-Red Ovens. Jensen Specialties, Inc., 9331 Freeland Ave., Detroit 27, Mich., is now offering a 20-page catalog descriptive of Jensen New Principle "Dual Heat" Infra-Red Ovens coordinated with Jensen Conveyors. Beginning with a dicussion of what New Principle Dual Heat is and what it means in terms of dollars and cents, the catalog illustrates and explains the advantages of coordinating conveyors with infra-red ovens in performing baking, drying, preheating, and dehydrating operations. Typical installations in a wide variety of plants are depicted and discussed. Copy free upon request.

Ransburg Electrostatic Coating Processes. Electrostatic painting methods which have enabled manufacturers to reduce paint and labor costs by 40 to 60 per cent are described in a 16-page booklet prepared by the Harper J. Ransburg Co., 1248 Barth Ave., Indianapolis 7, Ind. The booklet includes illustrations of more than 25 typical electrostatic spray installations in as many industries, with brief case histories provided on many of the installations. A variety of electrostatic detearing operations is also fully pictured.

One section of the booklet explains the principles of electrostatic spray and how the electrostatic coating zone creates a "wrap-around" and causes an even flow of atomized paint particles to all exposed exterior contours of the product being painted. Various sections contain helpful information for paint superintendents, chemists, production engineers, and top management in the consideration of their coating problems. Copy free upon request.

EXHAUST UNITS
for Spray Booths and Hazardous Locations

Fan Sizes 12" to 42"

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Also Manufacturers of a complete line of waterwash and dry type paint spray booths with accessories. *Send for details.*

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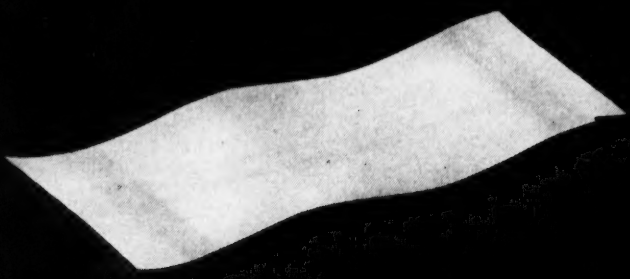
The Finishing Touch — By J. A. Patterson

"Oops! Hello, boss, I didn't see you standing there."

Products Finishing

CLEANING
PLATING
POLISHING
FINISHING

SEPTEMBER • • • 1947



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SCRATCH IT—Blue Knight Lacquer film won't chip away from the cut edge, proof of perfect adhesion. This property permits engraving when desired.

TWIST IT—No matter how you bend this strip, the finish will not flake off. Coats can often be cut by prefinishing metal sheets then stamped into shape.

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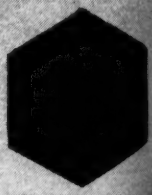
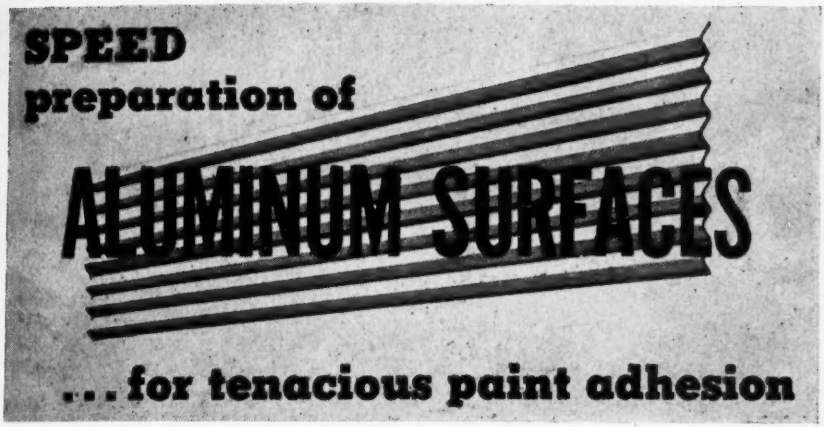
Try these simple tests yourself. See now this air dry finish refuses to chip, flake, or peel. What's more Blue Knight Flexible Lacquer needs no bake, air dries in regular lacquer time. No primer is needed. Clings fast to brass, aluminum, steel and die castings. Write for samples and full information today. Interchemical Corporation, Finishes Division, 51 State Street, Newark 2, New Jersey.

BLUE KNIGHT FLEXIBLE LACQUER

Interchem *Finishes*





MANY organic finishers preparing surfaces of aluminum and its alloys condition strips and fabricated parts with Oakite Compound No. 36 because it reacts safely, efficiently and economically when applied by hand, or in still-tank and washing machines.

A mildly acidic liquid, this specialized Oakite surface-conditioner microscopicaly etches, then develops a thin adherent phosphate film on work. It retards under-coat corrosion . . . provides a fine adsorptive base for good initial adhesion and permanent grippage of paint!

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Why not talk over details of your surface-treatment installation with your nearby Oakite Technical Service Representative? He is trained and experienced in the cleaning and conditioning of a wide variety of metals for every type of finish. Arrange for his FREE Service TODAY! Write on letterhead for Special Service Report or Oakite data sheets on any precleaning and conditioning problem. No cost, no obligation!

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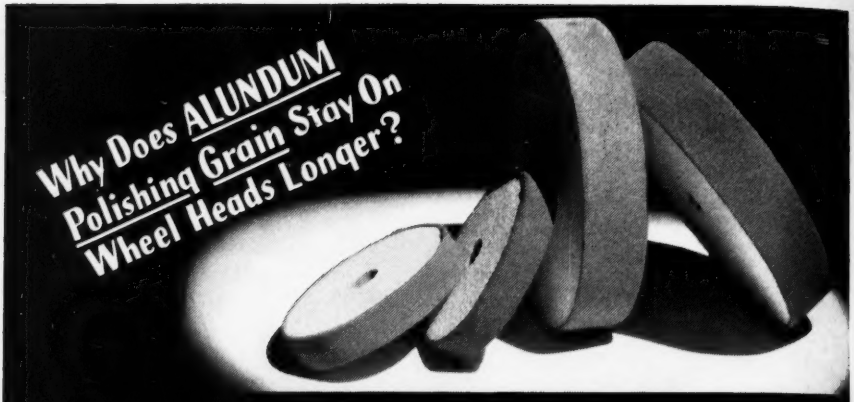
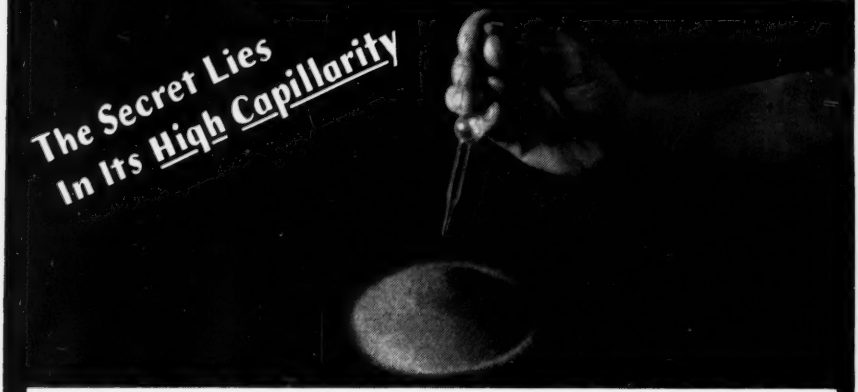
Technical Service Representatives in Principal Cities of the U. S. and Canada

OAKITE *Specialized* **CLEANING**

MATERIALS · METHODS · SERVICE · FOR EVERY CLEANING REQUIREMENT





See how the ALUNDUM Abrasive pictured above absorbs water—soaks up every drop? Thanks to a special NORTON manufacturing process it soaks up glue or cement in the same way.

Because each individual particle of abrasive soaks up adhesive rather than repelling it—every ALUNDUM grain sticks to the wheel head until its work is done—assuring strong, long-lasting, fast-cutting polishing wheels.

NORTON COMPANY • Worcester 6, Mass.

Distributors in All Principal Cities

NORTON ABRASIVES

Hanson-Van Winkle-Munning Company

Announces the

PR

PLATING PROCESS

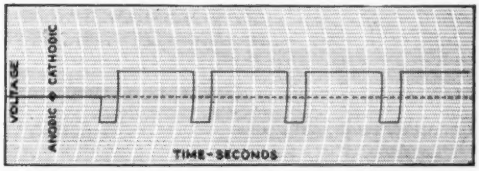
(The Periodic Reverse Current Electroplating Process)

The PR Plating Process, an engineering development of the Westinghouse Electric Corporation, involves plating in the conventional fashion for a given length of time, followed by current reversal for a short period. Repetition of this cycle provides the following advantages:

Typical Electronic Timer-Contactor Unit which effects current reversal at the plating tank.

1. Increased rate of plating
2. Improved surface brightness
3. Increased density of deposited metal
4. Improved metal distribution
5. Increased smoothness of deposit
6. Decreased porosity
7. Better corrosion protection
8. A method for obtaining heavier deposits

Characteristic Voltage-Time Cycle for H-V W-M PR Controller. Sample curve shows starting line at zero voltage. Short cycle is anodic; long cycle is cathodic.



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3639

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Inviting... and the "Finishing" Touch is Egyptian

When a finish of particular quality is desired it is natural to turn—as does Modern Mode Furniture Company—to Egyptian.

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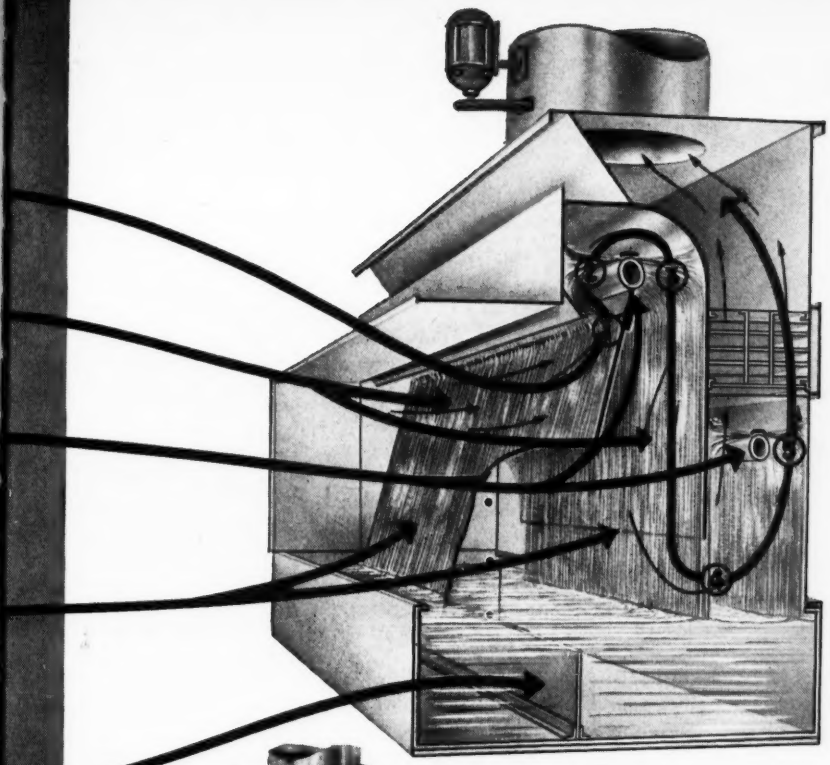

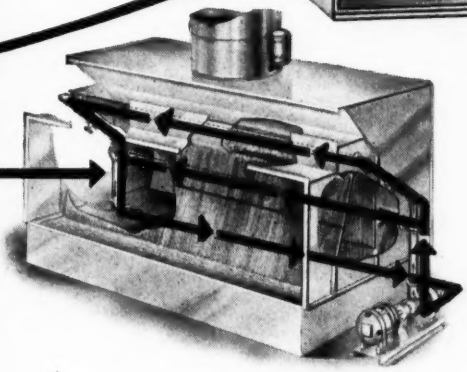

These are the reasons why you will find Binks Dynaprecipitor Water Wash Spray Booths in the finishing departments of America's leading manufacturers.

In brief: this is the most efficient spray booth you can buy.

• **Send Today** for your copy of this new 1947 Binks Catalog Data Book

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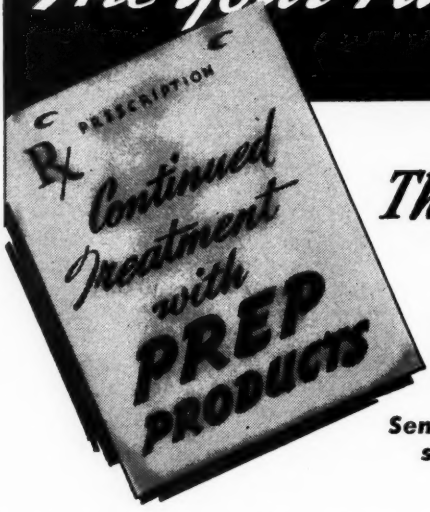
Are your Paint-Jobs Ailing?

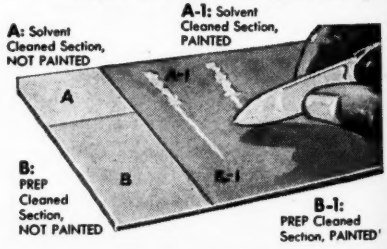


This Prescription will provide RECOVERY

Send us your "symptoms" and we shall be glad to furnish you a sample at no charge.

Give us the (1) General description, size and shape of the article to be treated. (2) Approximate number of pieces to be handled per hour or per eight hour shift. (3) Description of present cleaning methods available, such as, vapor degreasing, alkali cleaning, etc. (4) Probable method of handling articles, such as mono-rail conveyors, hand dipping, manual cleaning, etc. (5) Facilities available for heating materials, such as, gas firing, steam coils, etc. (6) Probable space available for such equipment as may be necessary. (7) Type or metal to be treated: hot or cold rolled steel, aluminum or aluminum alloys, terneplate, etc. (8) Is the problem primarily cleaning, paint adhesion, scale removal, rust-proofing, etc.?

Make the adhesion test below with PREP Products and prove their superiority.



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A BUYING GUIDE FOR ABRASIVES

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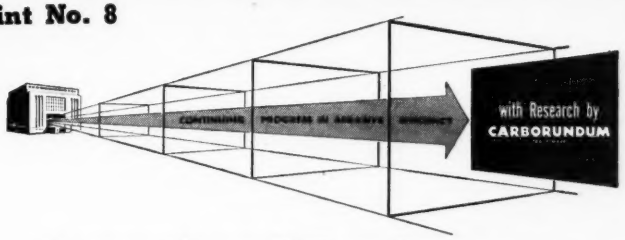

Research and Development

The Carborundum Company is considered a good source of supply for abrasive products because of its outstanding research accomplishments. Research at The Carborundum Company is aimed at developing uniform abrasive products that cut faster...cut cooler...grind more pieces per wheel...improve the finish and, in other ways, improve grinding efficiency.

Because abrasive research is part of the very foundation of The Carborundum Company, users can rely on abrasives by CARBORUNDUM as being in the forefront of technical improvement. It is this assurance which leads so many manufacturers, noted for production efficiency, to prefer abrasives by CARBORUNDUM. The Carborundum Company, Niagara Falls, New York.

A Good Rule for Good Grinding...CALL IN

CARBORUNDUM

TRADE MARK

- BONDED ABRASIVES
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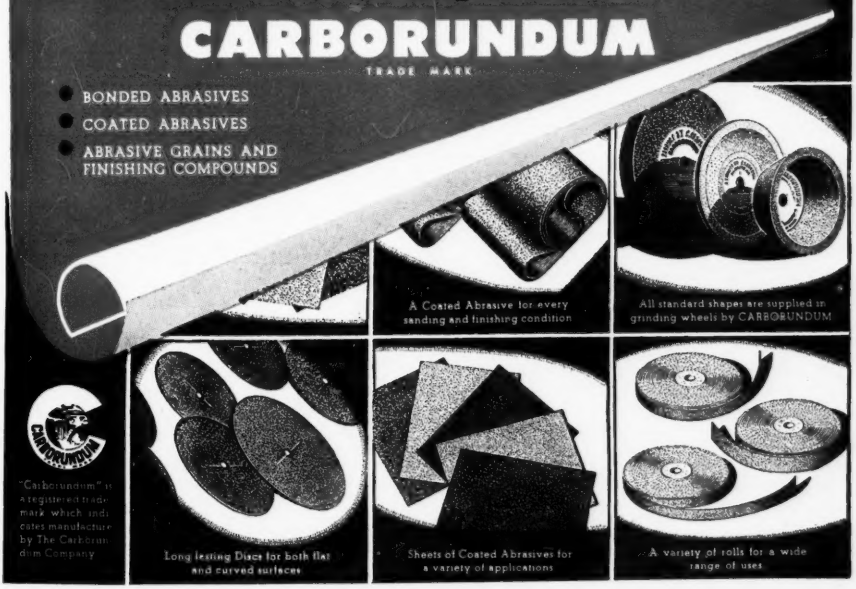
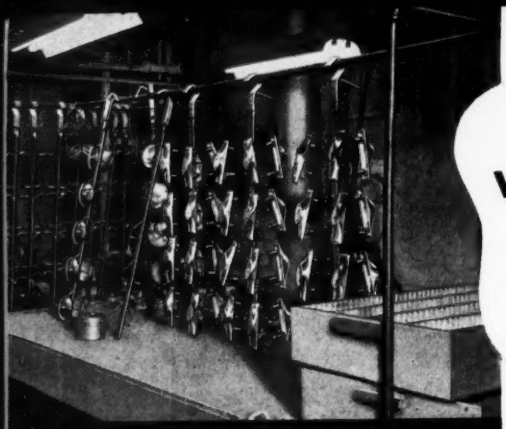
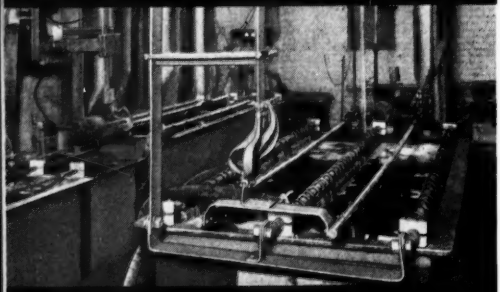
- ABRASIVE GRAINS AND FINISHING COMPOUNDS

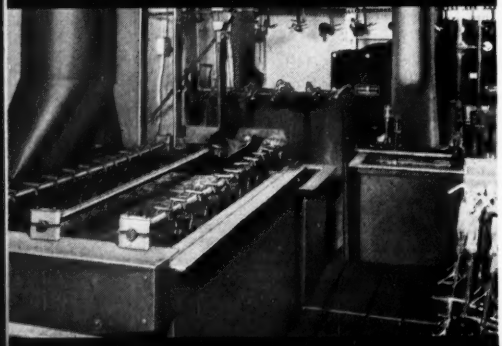

A Coated Abrasive for every sanding and finishing condition
All standard shapes are supplied in grinding wheels by CARBORUNDUM
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company
Long lasting Discs for both flat and curved surfaces
Sheets of Coated Abrasives for a variety of applications
A variety of rolls for a wide range of uses



Racking table. Three types of NANKERVIS racks are used to hold mirror backs, arms and mounting plates. NANKERVIS racks are insulated with Glencote No. 2 for greatest durability.



Copper, Nickel and rinse tanks form a compact group for speedy work with no conveyor required. Filters are used with both plating tanks to insure clean plating solutions.



The Chrome tank. Parts are cold water sprayed then hot rinsed after chroming. Pieces are then removed from racks and travel by conveyor to the assembly department.

WE PLATE 9000 PIECES PER DAY!

—AJAX MANUFACTURING CO.

DESIGNED AND INSTALLED BY GEORGE L. NANKERVIS CO.

Three thousand Rear View Mirrors per day is standard at the Ajax Manufacturing Company. Three parts to be chrome plated —mirror back, arm and support– that's 9,000 pieces per day from this compact plating department. Efficiency and uniformity of plating are assured by NANKERVIS installations whether the plating department is small or the largest built to date.

PLATING PROBLEMS OUR SPECIALTY —Write for an "On the Job" consultation without obligation.

GEORGE L. *Nankervis* COMPANY

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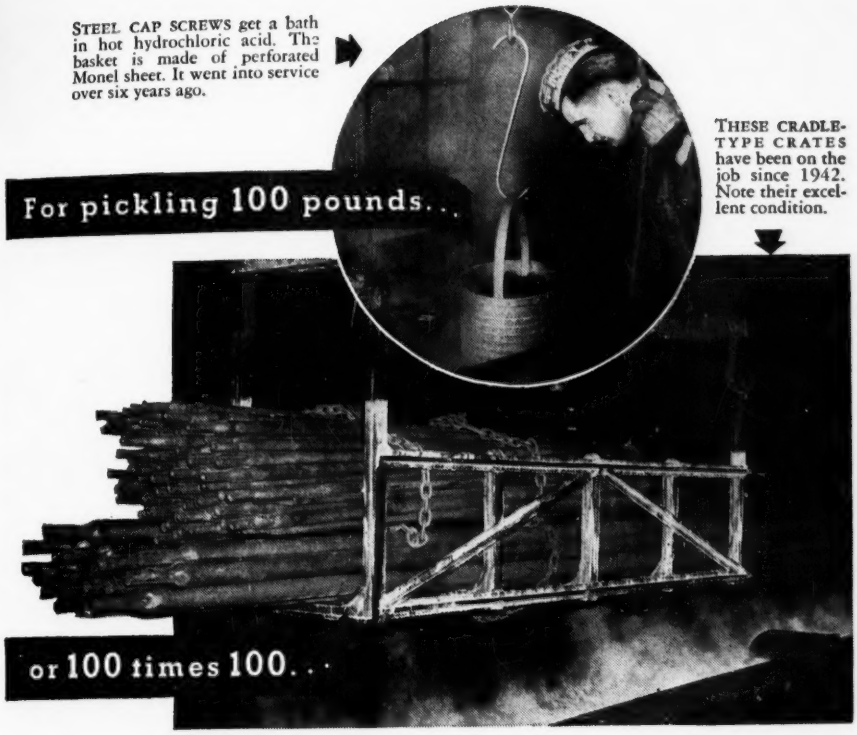
COMPLETE METAL FINISHING EQUIPMENT


STEEL CAP SCREWS get a bath in hot hydrochloric acid. The basket is made of perforated Monel sheet. It went into service over six years ago.
THESE CRADLE-TYPE CRATES have been on the job since 1942. Note their excellent condition.
For pickling 100 pounds...
or 100 times 100...

GET THE EXTRA FEATURES OF MONEL

There's no need to pile on *dead* weight to get stronger, longer-lasting baskets or crates.

Just use Monel*. It resists corrosion by sulfuric acid and dilute hydrochloric acid.

With Monel, you handle bigger pay loads faster and with *safety*. You save time . . . labor . . . power . . . acid.

You save another way, too. *Even equipment that must be designed for a special job* can be readily fabricated from regular Monel mill forms (rods, bars, angles, etc.)

Remember the advantages of Monel when a pickling problem has you stumped. Remember also that experienced fabricators like THE YOUNGSTOWN WELDING & ENGINEERING COMPANY, Youngstown, O. (who made the basket and rack above) can offer practical help in design and fabrication.

THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall Street, New York 5, N.Y.*

MONEL* **NICKEL** EMBLEM OF SERVICE INCO TRADE MARK **ALLOYS**

MONEL* • "K"* MONEL • "S"* MONEL • "R"* MONEL
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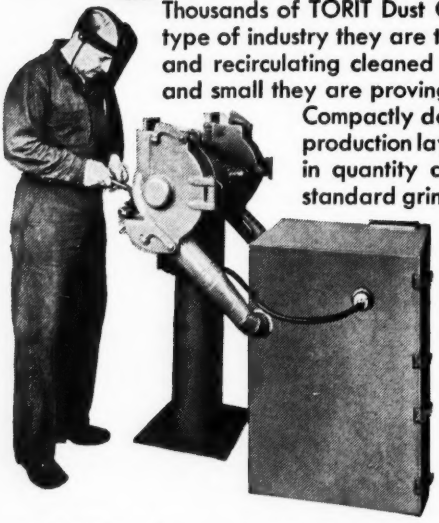
*Reg. U.S. Pat. Off.

You can grind out production records when you eliminate the dust menace with

TORIT DUST COLLECTORS



Thousands of TORIT Dust Collectors are now in use. In every type of industry they are trapping abrasive dust at its source and recirculating cleaned air into the room. In large plants and small they are proving economical to own and operate. Compactly designed TORIT Dust Collectors fit all production layouts. They are now being produced in quantity and sizes and capacities to fit all standard grinding, polishing and cut-off machines are available for immediate delivery. For complete information and latest TORIT catalog write:

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can help you get them!

Your Glidden Service Man is a specialist. He can give you the benefit of broad experience in the field of industrial finishing.

Let me discuss your finishing methods with you. If you wish, I'll analyze your finishing department from end to end, and then give you a report. Just one suggestion may lead to thousands of dollars in savings a year. There's no charge or obligation.

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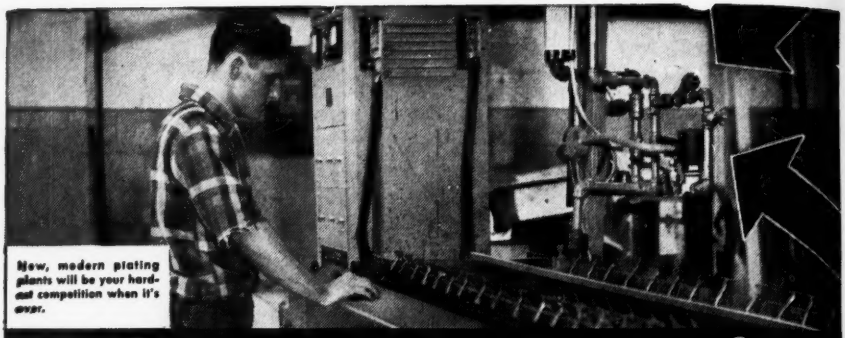
★ Glidden *Pacemaker in Paints*

INDUSTRIAL FINISHES FOR EVERY PURPOSE



Did you **E-X-P-A-N-D** *too fast?*

The contribution of the plating industry to the war effort will never be completely told. Production was doubled and trebled overnight—without time to engineer the job for efficiency, and with many needed accessories not available.

When it is over, only the more efficient plating plants will survive. Faster plating, more automatic, more exacting tolerances and lower costs will be demanded—and obtained.

These strong statements are based on what we know has been done with Sarco in the past few years. From hot water storage tanks to simple wash tanks, and exacting chrome plating to anodyzing, there is a Sarco temperature control that is inexpensive, easy to install and simple to adjust and operate.

You can speed up production, eliminate rejects and reduce fuel costs by the addition of Sarco equipment to your present installation. The Sarco representative will study your plant — make recommendations—save you time and money without obligation.

Sarco TR 21 Control on hot water storage tank

Sarco No. 87 Control on caustic tank

Sarco Electric Control on chromium plating tank

50

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475 FIFTH AVENUE
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Represented in Principal Cities

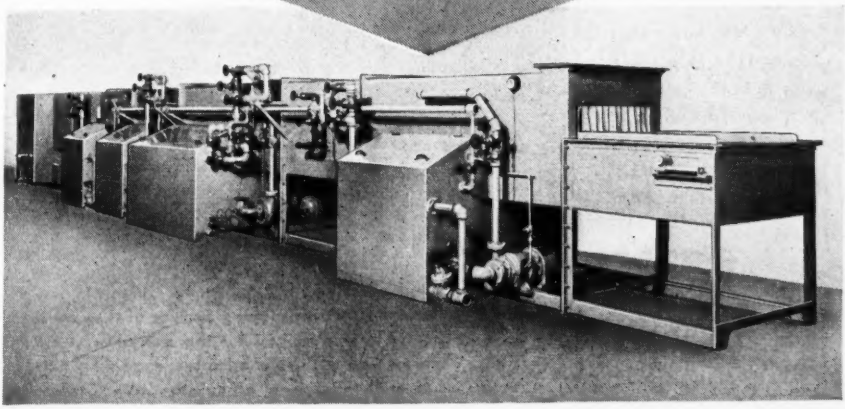
SARCO Saves Steam

SARCO CANADA, LTD., 83 Richmond Street, West, TORONTO, ONTARIO

METALWASH EQUIPMENT

... For Cleaning and Rustproofing Small Parts

This METALWASH Machine automatically cleans, rustproofs and dries —all in one compact, complete unit—improves quality, increases production.

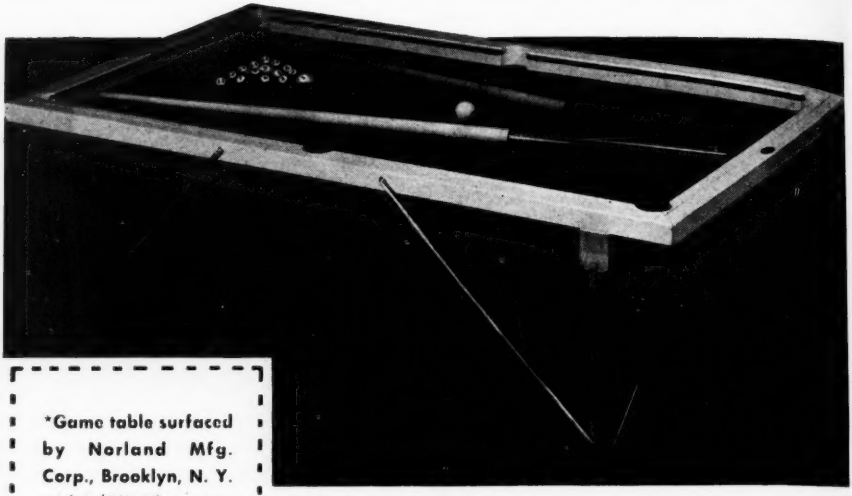


METALWASH MACHINES are equipped with special designed spray nozzles, fed by powerful pumps — do a thorough cleaning job in minimum time. These Machines are sturdily constructed throughout — economical in operation. Write for information concerning Standard or Special

CLEANING • PICKLING • DRYING • RUSTPROOFING EQUIPMENT

METALWASH MACHINERY CO.
149-155 Shaw Avenue Irvington 11, N. J.

Take Your Cue from Norland*



*Game table surfaced by Norland Mfg. Corp., Brooklyn, N. Y. with 1/32" Claremont Rayon Flock sifted on silk-screen adhesive applied to masonite & composition board.

...for quality and uniformity—use

CLAREMONT FLOCK

BEAUTY
Rich surface textures simulating custom fabrics in a full range of appealing colors.

VERSATILITY
Provides a superior finish on almost any surface or shape: wood, metal, glass, paper, cork, etc.

ECONOMY
Quickly and easily applied using standard, low-cost equipment.

The durable and attractive playing surface of the new Norland Junior Pool Table is obtained by the use of a CLAREMONT Flock . . . providing a richer and more appealing finish than conventional cloth coverings at substantially lowered costs

"We use Claremont Flock", states Mr. Adler of the Norland Manufacturing Corp., "because we can depend on its quality and uniformity."

Take your cue from this user and look to Claremont for the answer to your finishing needs. Samples for test runs, together with full details on uses and application techniques available upon request. Inquiries invited!

CLAREMONT WASTE MFG. CO.
CLAREMONT, NEW HAMPSHIRE

yes! with ONE APPLICATION
NO SPECIAL EQUIPMENT...

M & W's new MOTLETONE gives a lustrous finish . . . truly like hammered metal

Use metal . . . plastic . . . or wood — with Motletone a single spray-coat application gives it that lustrous hammered finish effect that's so popular today. What's more, your regular spraying equipment does 100% of the job. Because of its smooth yet hammered-like appearance, Motletone tends to hide weld marks, scratches or other small defects, and that means fewer rejects and additional savings of production time.

This new, durable M&W production finish is now available in a complete range of colors, formulated for either baking or air-drying schedules. Write for Technical Data Bulletin 108 and sample color cards or arrange to have an M&W technical consultant discuss your own requirements with you.

PIONEERS IN PROTECTION
M&W Co. 1876

. . . where industry goes with finishing problems

MAAS & WALDSTEIN COMPANY
NEWARK 4, NEW JERSEY

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PRODUCERS OF LACQUERS, ENAMELS, SYNTHETICS AND SPECIALIZED PRODUCTION FINISHES

New Baker Line of Gold Plating Solutions

We have now added a new series of solutions to our line. These are:

Concentrated Gold Plating Solution No. 319, containing one troy ounce of fine gold.

Concentrated Gold Replenishing Solution No. 320, containing one troy ounce of fine gold.

Concentrated Underplate or Strike No. 321S, containing one-half ounce of fine gold.

Gold Coloring Solutions for Light Yellow, Red and Green Gold.

Let us send you our instruction booklet for these.

If you are contemplating new installations or changes in your present equipment, we may be able to help you with money saving suggestions. We shall be glad to have you consult us.

BAKER & CO., INC.
113 Astor Street
Newark, N. J.

Better

RANDOLPH FINISHES

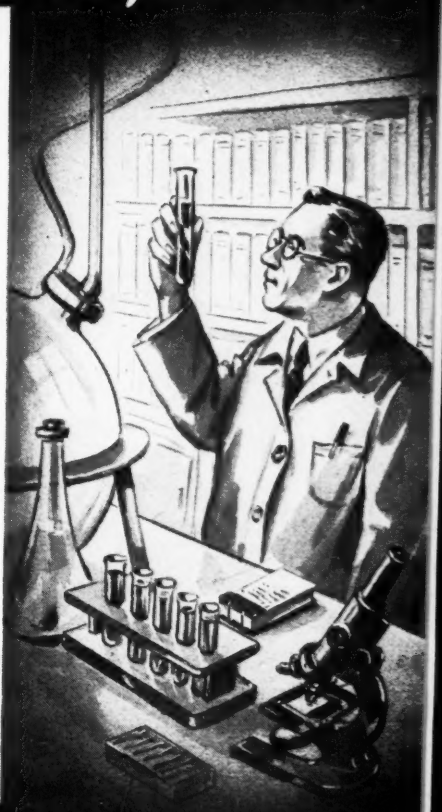
through Research

Research has always been regarded as the most important single function of the Randolph Organization. Great care has been exercised in assembling a staff of expert technicians and large sums of money invested in the finest modern laboratory equipment and facilities.

This policy has made it possible to constantly improve established Randolph products and to develop many new scientifically correct finishes for special and exacting requirements.

The soundness of this policy is proved by the ever increasing demand for Randolph finishes which required a 25% increase in our plant facilities last year and a further increase of 25% which is now being planned.

We invite you to submit your special and difficult finishing problems to us.



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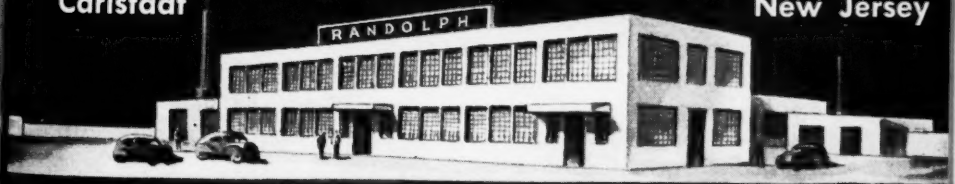
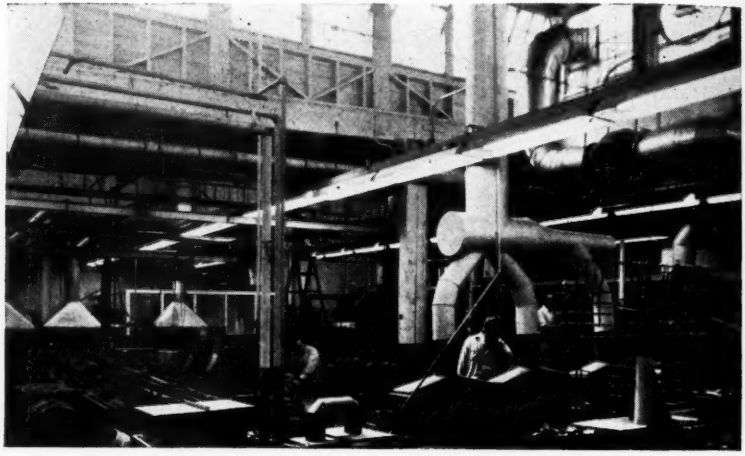
RANDOLPH PRODUCTS COMPANY

Carlstadt New Jersey



AMERICAN BOSCH PLANT GETS WITH G-E RECTIFIER "PACKAGE"

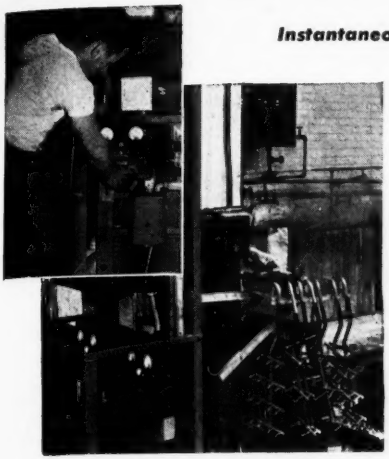
General Electric units keep watch over tank conditions 24 hours a day — put flexible, push button control in plating room, next to tanks



In a move for increased efficiency in plating power equipment, American Bosch Corporation of Springfield, Mass., manufacturer of precision automotive and aircraft equipment, has recently completed installation of an entire new bank of General Electric rectifiers with automatic voltage control. Running on a 24-hour-a-day schedule, this combination of General Electric rectifiers, automatic "on load" controls, and operator's control boxes maintains automatic control over 5,000 amperes of plating current.

With rectifiers and automatic voltage-control units located entirely clear of the plating room, the installation provides easy checks and maintenance of equipment without interruption of plating operations. Operator's control boxes, however, are located where they are needed, right at the tanks, for convenient readings and instantaneous push button control for necessary changes in voltage. In general, the installation gives flexibility, when and where it is needed, and constant voltage for long, consistent runs.

AUTOMATIC VOLTAGE CONTROL



Push button control located next to tanks gives operator at American Bosch Corporation on-the-spot control of plating voltage.

Instantaneous Push Button Control of Voltage

"Start," "stop," "raise," and "lower" buttons on operator's control box give immediate response when changing voltage conditions are required. Operator merely holds button down until necessary voltage is reached. On reaching required voltage, General Electric automatic "on load" induction-type control maintains constant voltage throughout operation. Stepless voltage changes, and no rheostat losses on partial load.

Automatic Operation With "Packaged" GE "2000" Rectifiers and Controls

Typical automatic "package" consists of the General Electric 12-kw "2000" rectifier in combination with induction-type "on load" rectifier control and operator's control box. The combination automatically maintains output voltage from *no load* to *full load* within ± 2 per cent, gives complete flexibility regardless of load requirements.

Maintenance of units is negligible; efficiency of operation is high. Result: an economical power system with low maintenance cost and with all the convenience needed for the most exacting plating operations.

For assistance in converting your plating shop to General Electric "packaged" power units — or for descriptive data — write to Section A82-968, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

GENERAL ELECTRIC

Cowles

THE COMPLETE, COST REDUCING LINE OF *Metal Cleaners*

THESE COWLES SPECIALTIES MAKE METAL CLEANING *Easier!*

SOAKLEEN — presoak cleaner for die castings—it penetrates and loosens buffing compounds and tripoli.

KW & 347 — alkaline electro cleaners for die castings, brass, copper and steel—also can be used in washing machines — free rinsing.

LIXOL — *improved* emulsion solvent type cleaner for all metals in still tanks and washing machines—also rust preventive for steel . . . ideal for precleaning before Bonderizing.

MURAC — inhibited acid cleaning and descaling compound—does not attack base metal noticeably.

TECHNICAL SERVICE ON REQUEST.
We will gladly make recommendations.
Prompt Delivery.

- *For Steel* — AP - EL - 345 - 320
- *For Aluminum* — AE - PC - LIXOL
- *All purpose, low cost washing machine cleaners* — B - PS - SM - LIXOL
- *Non-clogging steam jenny cleaner* — GM
- *Wire coating compound* — WC
- *All purpose stripper* — ST

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METAL CLEANER DEPARTMENT
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10,000 pr. each sizes 10½, 11, heavy-duty rubber gloves, 14" gauntlet, cuffable. Highest quality, for acid handling, anode processed by B. F. Goodrich, U. S. Rubber Co. Subj. prior sale, low price 60c pr., quantity discount, net 10 days, f.o.b. Louisville, Ky. Minimum quantity 6 doz. Write N. L. Fine, Agent, 2123 Dorothy Ave., Louisville 5, Ky.

FOR SALE

3-10 H.P. double spindle, heavy duty buffing lathes. Never used. 10% discount off present list. Write: Ford Metal, Box 57, Hackensack, N. J.

This Opportunity Section is available for classified advertisements. For advertising rates and other information address:

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STAIN AND FILLER MAN

Wanted, a thoroughly experienced Stain and Filler man who can supervise formulation of stains, fillers, etc. We want a man who has a thorough knowledge of the woods used and is thoroughly conversant and experienced in the application of all wood finishing materials and the production problems encountered in selling the wood furniture trade. Please state age, previous experience in detail, educational background, and salary expected. All replies completely confidential. Address your reply to Sales Manager, The Glidden Company, Nubian Industrial Division, Chicago 39, Illinois.

FOR SALE

Monorail, Gas Fired, R. C. Mahon Cleaning, Bonderizing and Paint Finishing Systems. Metal Production and Tool Room Machines. Central Illinois. 20,000 Sq. Ft. 2-Bldg. All or Part. Write Box 93, Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

MANUFACTURERS' REPRESENTATIVE AVAILABLE

To take on additional lines — spraying and spray booth equipment, paint drying and baking equipment, and related product finishing items. Can give first class representation in Indianapolis and Central Indiana. Well established. Have operated in this area for the last ten years. Box 99, PRODUCTS FINISHING, 431 Main St., Cincinnati, Ohio.

BOOKS

Industrial Machinists Handbook. World's best reference of general information. $10.98. Address remittance to: David Nichols & Co., Rockmart, Georgia.

FOR RESALE

Change in operating plans requires resale of 3 mo. old belt conveyor, wash, double rinse and dry machine. This machine has a 46" wide belt and is complete with thermostatic control and ventilating equipment. New machine guarantee. Address Box 97, Products Finishing, 431 Main St., Cincinnati 2, Ohio.

CATALOGS

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Infra-Red Ovens and Conveyors

A 20-page catalog published by Jensen Specialties, Inc., 9331 Freeland Ave., Detroit 27, Mich., illustrates and explains the advantages of coordinating infra-red ovens with conveyors in performing baking, drying, preheating, and dehydrating operations in a wide variety of fields.

2. Surface Conditioning

Oakite CrysCoat Process, a precise surface-conditioning procedure for cleaning, rustproofing, and phosphatizing steel parts in one quick application, is the subject of a special service report released by Oakite Products, Inc., 32F Thames St., New York 6, New York.

3. Metal Cleaning Equipment

A folder telling how seven famous companies solved their production cleaning problems is now being issued by The Alvey-Ferguson Co., 631 Disney St., Cincinnati 9, Ohio.

4. Plating Rectifiers

Copper-oxide rectifiers and controls for electroplating and anodizing are the subject of a catalog issued by the General Electric Co., Section A1251-70, Appliance and Merchandise Dept,. Bridgeport, Conn.

5. Electrostatic Spraying

Electrostatic painting methods which have enabled manufacturers to reduce paint and labor costs by 40 to 60 per cent are described in a 16-page illustrated booklet prepared by the Harper J. Ransburg Co., 1248 Barth Ave., Indianapolis 7, Indiana.

6. Centrifugal Dryer

The Dellinger Mfg. Co., 729 N. Prince St., Lancaster, Pa., is now offering a fully illustrated bulletin showing the Kreider Centrifugal Dryer in use and giving complete specifications.

7. Wrinkle Finishes

A bi-monthly report on wrinkle finish developments and applications and listing approximately 200 manufacturers of wrinkle finishes and coatings is now being offered by New Wrinkle, Inc., 1765 Springfield St., Dayton Ohio.

8. Spraying Compounds

A 12-page profusely illustrated booklet published by the J. J. Siefen Co., 5633 Lauderdale, Detroit 9, Mich., discusses an efficient method of spraying liquid polishing and buffing compounds on revolving wheels.

9. Solvent Degreasing

A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants and describes typical kinds of degreasers has been published by the Detrex Corp., Box 501, Roosevelt Park Annex, Detroit 32, Michigan.

10. Filters
Alsop Engineering Corp., 206 Keen St., Milldale, Conn., is now issuing a profusely illustrated book explaining the fundamentals of filtration for various plating applications.

11. Metal Parts Washers
A 28-page book descriptive of metal parts washing machines engineered by G. S. Blakeslee & Co., Chicago 50, Ill., is now available from this firm.

12. Chemicals and Coatings
An eight-page quick reference list of rustproofing chemicals, protective coatings, metal-cleaning chemicals, and inhibitors has been released by the American Chemical Paint Co., Ambler, Pa.

13. Dust Control Unit
A four-page folder published by The Kirk & Blum Manufacturing Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio, illustrates and discusses the operation, features, and specifications of a portable self-contained dust control unit for use with grinders, buffers, polishers, and other equipment.

14. Electroplating Conveyors
Complete details on elevator type full-automatic electroplating conveyors are contained in Bulletin FA-103 published by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

15. All-Purpose Lacquer
The Randolph Products Co., Carlstadt, N. J., is offering a color card on an all-purpose lacquer, known as "Randolac," which is available in a full range of colors for use on metal and wood.

16. Metal Parts Cleaning
An illustrated bulletin describing equipment and detergents for modern metal parts cleaning operations is now being offered by the Optimus Equipment Co., 133 Church St., Matawan, N. J.

17. Spray Booths
Schmieg Industries, Inc., 314 Piquette Ave., Detroit 2, Mich., has published an eight-page illustrated folder on its "Centri-Merge" spray booths, designed and built to fit both plant and product.

18. Degreasers
The Mechanical Process Co., South Orange, N. J., has prepared an eight-page illustrated folder describing its D'Oiler Degreasers for metal which include two and three-dip, vapor spray, barrel, automatic and semi-automatic, and special large degreasers.

19. Buffs
A complete line of buffs for every buffing requirement, as well as polishing wheels and compositions, are described in a six-page illustrated folder released by The Udylite Corp., 1651 E. Grand Blvd., Detroit 11, Michigan.

20. Bonderizing
The Parker Rust Proof Co., 2172 E. Milwaukee Ave., Detroit 11, Mich., has issued a 44-page profusely illustrated catalog on the Bonderizing process for the adhesion of paint to metal and resistance to corrosion.

21. Organic Finish
"Polytherm," a heat-resistant organic finish for use on electrical equipment such as generator housings, ironers, hot plates, and space heaters, is the subject of a booklet prepared by the Interchemical Corp., Finishes Div., 350 Fifth Ave., Empire State Bldg., New York 1, N. Y.

22. Lead and Tin Fluoborate
Technical Information Manual LTF-1 containing extensive data on plating lead-tin alloys, including full details on bath make-up, operation, and so on, is now available from the General Chemical Co., 40 Rector St., New York 6, New York.

PRODUCTS FINISHING
431 Main St., Cincinnati 2, Ohio

I am interested in receiving the following literature reviewed in your September issue.

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Index TO ADVERTISEMENTS

Abbott Ball Co. 50
Acme Mfg. Co. 107
Allwood Lime Co. 130
Alsop Engr. Corp. 111
Alvey-Ferguson Co. 27
American Chemical Paint Co. 119
Automotive Rubber Co. 81

Baughn Chemical Products Co. 70
Behr-Manning Corp. 85
Binks Mfg. Co. 6, 7
Blakeslee & Co., G. S. 92
Bacon Felt Co. 44
Baker & Co., Inc. 18

Carborundum Co. 9
Cincinnati Cleaning & Finishing Mchry. Co. 71
Claremont Waste Mfg. Co. 16
Clinton Co. 75
Cowles Detergent Co. 22

Davis-K-Products Co. 128
Despatch Oven Co. 67
Detrex Corp. ..... Fourth Cover
Detro Sales Co. 42
DuBois Co. 124, 125
Du-Lite Chemical Corp. 121
Duriron Co., Inc. 99

Egyptian Lacquer Mfg. Co. 4
Electric Products Co. 87
Enthone, Inc. 91
Exolon Co. 73

Ferro Enamel Corp. ..... Between Pages 36-37
Fine, N. L. 133
Ford Metal Moulding Co. 133
Fostoria Pressed Steel Corp. 97
Fuller & Co., W. P. 65

General Chemical Co. 52, 53
General Electric Co. 20, 21
General Electric Co., Lamp Div. 35
Gifford-Wood Co. 79
Glidden Co. 13
Glidden Co., Nubian Industrial Div. 133
Green Electric Co., Inc., W. 115
Greene-Tweed & Co. 68

Hammond Mchry. Builders, Inc. 77
Hanson-Van Winkle-Munning Co. 3
Harrison & Co., Inc. 122
Harshaw Chemical Co. 103

Ideal Chemical Co. 120
Interchemical Corp., Finishes Div., Second Cover
International Nickel Co., Inc. 11

Jackson Buff Co. ..... Between Pages 68-69
Jensen Specialties, Inc. 57

Kalamazoo Tank & Silo Co. 78
Keystone Emery Mills 114
Kirk & Blum Mfg. Co. 101

M & E Mfg. Co. 131
Maas & Waldstein Co. 17
Magnuson Products Corp. 76
Mahon Co., R. C. 60, 61
Manderscheid Co. 117
McDougall-Butler Co., Inc. 126
Metalwash Mchry. Co., Inc. 15
Michigan Chrome & Chemical Co. 93
Motor Generator Corp., Div. of Hobart Bros 64

Nankervis Co., Geo. L. 10
Neilson Chemical Co. 8
New Wrinkle, Inc. 47
New York Blower Co. 69
Nichols & Co., David 133
Niederst Co. 40
Norgren Co., Inc., C. A. 105
Norton Co. 2

Oakite Products, Inc. 1
Optimus Equipment Co. 46

Packer Machine Co. 51
Parker Rust Proof Co. 83
Pennsylvania Salt Mfg. Co. 63
Pittsburgh Plate Glass Co., Brush Div. 29
Precision Paper Tube Co. 118
Proctor & Gamble 48
Production Machine Co. 129

Randolph Products Co. 19
Ransburg Co., Harper J. 32, 33
Ransohoff Inc., N. 39
Rayon Processing Co. of R. I. 123
Robinson & Son, A. 49
Rolock Inc. 113

Sarco Co., Inc. 114
Singleton Co. 116
Specialty Products Co., Inc. 45
Standard Electrical Tool Co. 58
Standard Varnish Works ..... Third Cover
Stanley Chemical Co. 95
Stevens, Inc., Frederic B. 37
Sturgis Products Co. 127
Sulphur Products Co. 86

Torit Mfg. Co. 12

Udylite Corp. 31
U. S. Stoneware Co. 59

Wagner Brothers 43
Watson-Standard Co. 89
Wyandotte Chemicals Corp. 41

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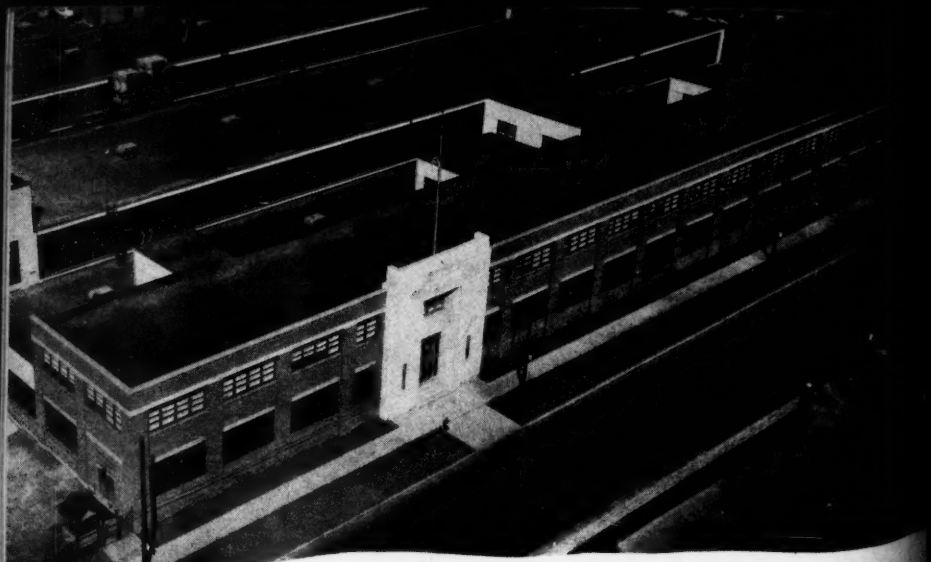

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